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Original Articles

THE RÔLE OF SPEECH TRAINING IN A PROGRAM OF ORTHODONTIC TREATMENT*

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YOUR invitation to discuss our mutual problems is a source of much gratification to me, a teacher of speech. The literature of your field has frequently mentioned the obligation of the orthodontist to secure optimum conditions for the phonetic activities of his patients; and discussions at conferences on speech correction are emphasizing the relationships between speech improvement and orthodontic treatment. In fact, programs for speech education now in the process of formulation uniformly contain recommendations for proper orthodontic care in early childhood and throughout the school career. It is not often, however, that orthodontists and speech correctionists can meet face to face for consideration of the problems common to practice and theory in both fields. Therefore, I am especially grateful for the privilege of discussing some of these questions this morning.

May I begin with a brief analysis of the job of speech correction with particular attention to cases of malocclusion and malfunctioning of the oral mechanism?

Speech training is directed toward promoting the resourcefulness of individuals in their use of spoken words as a means of communication. Such resourcefulness depends upon mastery of many specialized technics which may be classified roughly as social, semantic and phonetic, referring respectively to abilities in making contacts with other human beings, facility in getting and giving meanings, and skill in producing and interpreting appropriate phonetic patterns. This discussion, however, is directed largely toward

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phonetic aspects of speech behavior because of their dependence upon orthodontic conditions and because of the great influence which various kinds of treatment for oral and dental anomalies exert upon the processes involved in remedial phonetic training.

The product toward which speech training is directed is "good speech" —not just normal speech. "Good speech" should confirm to two commonly accepted criteria: effectiveness in producing the behavior desired and hygienic use of the mechanism. The effectiveness of speech is assured when it is:

1. Intelligible rather than jumbled, indistinct, or inaudible.
2. Pleasant, clear and rich in quality rather than noisy harsh, husky, muffled, flat, thin, or colorless.
3. Vigorous, flexible and free rather than weak, explosive, tense, strident, or tremulous.
4. Appropriate in melody rather than whining, querulous, aggressive, dictatorial, patronizing, monotonous, or stereotyped.
5. Accurate and fluent in phrasing rather than halting, jerky, or meaningless.
6. Appropriate in tempo rather than too slow, scanning or rapid.
7. Acceptable in pronunciation rather than nasalized, inverted, glottalized, flattened, or abounding in substitutions, omissions, additions, or in misplaced stress.

Hygienic use of the mechanism implies freedom from excessive and inappropriate motor tensions and easy, quiet breathing.

Should we translate these affective traits or psychologic aspects of good speech into acoustic terms we should say good speech consists of:

1. Tones rather than noises.
2. Low tones rather than high ones.
3. Low air pressure rather than high expenditure of energy.
4. Vocalized breath rather than waste air.
5. Consistent tone quality rather than inconsistent.
6. Balanced resonance rather than predominance of isolated "frequency bands."
7. Accuracy in production of various speech sounds rather than inconsistent or inaccurate phonemes.

Everything else being equal, such acoustic phenomena are more likely to be obtained by a mechanism which has the following characteristics:

1. A fairly low and wide palatal arch, not too flat.
2. A tongue which approximates in width and length the general contour of the palatal arch.
3. A tongue-blade which can move freely and is not impeded by the lingual frenum.
4. Teeth which can be closed with a relatively complete obstruction of air and free from open spaces between dentures.

5. A uvula, flexible and large enough to close off the nasopharynx.
6. An absorbant lining for the oral cavity.
7. A fairly wide opening at the fauces.
8. A fairly wide oropharynx, and nasopharynx unobstructed by growths such as adenoids, etc.
9. Comparatively large apertures at the turbinates.
10. Large nasal fossae.
11. Thyro-arytenoid folds which are long, moderately rounded, freely movable, and provided with free margins.
12. Free, agile muscles operating the soft palate, tongue and thyro-arytenoid folds, and walls of the pharynx.

When such conditions do not prevail, rather definite and consistent types of undesirable phonetic responses result.

Low wide palatal arches are usually found in persons who have voices characterized by predominance of low overtones rather than high ones providing the fundamental tone be produced without excessive tension of laryngeal and pharyngeal musculatures. A very flat arch, however, is found frequently among persons whose voice quality contains only a very few lower partials and no higher ones. The latter condition is charactered as thin, dull, muffled, indistinct, and colorless by both experienced and inexperienced diagnosticians. The voice typically found in the reasonably low but well-formed arch is called resonant, rich, and well balanced by a similar group of judges. Should the palatal arch be narrow and very highly vaulted, the quality of tone produced abounds in upper partials and is described as brilliant, clear, lyric, and thin. Many persons prefer the lyric type of resonance blends to the richer cello tones, particularly in singing. The majority of judges, however, indicate that, in general, in speech the audibility and the richness of vowels are more likely to result from playing up a relatively large number of lower tones.

The reliability of the statements just made is, of course, subject to the reservation "all things else being equal." In real situations "all things else" never are equal and must be taken into consideration. The alterations made in the oral and pharyngeal cavities from which our speech patterns result are largely effected by the action of the tongue, and distinctness of utterance depends for the most part upon precision with which nice articulation between tongue, palate, gums, and teeth can be consummated. When a large, flat, wide tongue must articulate with a narrow, high arch we usually get what is known as a lateral lisp. The sibilants "s" and "z" sound like voiceless "l." Such a substitution usually distorts the phonetic patterns to such an extent that the speaker is unintelligible, and exhibition of such a defect constitutes a bar to eligibility for teaching in certain school systems. This same discrepancy between contour of tongue and arch usually carries with it a tendency to produce dull, low pitched, indistinct sounds of "t," "d," "k" and "g." High-pitched "t," "k," "s," "sh" sounds mark off vowels more distinctly than lower-pitched examples of the same phonemes and are an important factor in precision of speech. Long thin tongues ordinarily are more easily subjected to the kind of manipulations which give a thin "blade of air"

and a higher pitched sound. Production of such sounds is seriously interfered with by any condition which does not permit the pointing of the tongue, such as incompatibility between arch and tongue contour, tongue-tie, or malfunctioning of the neuromuscular mechanisms involved.

The person with the undershot or prognathic jaw frequently drops the back of the tongue in making contact with the gumridge for "s" and consequently has three rather large apertures through which air is escaping, one at each side of the back of the tongue and a third at the blade. The effect is that of several low-pitched sibilants sounded in unison. Individuals with marked overbites frequently substitute "f" and "v" for voiced and voiceless "th," and omit different medial consonant combinations. These peculiarities are sometimes interpreted as infantile speech and therefore become a possible source of social maladjustment.

In overbites air escapes through openings at the back of the tongue, and through buccal apertures, thereby giving a blurred shushing sound. Attempts at fluency of utterance are thwarted because of indistinctness resulting from the confusion between consonants too low in pitch to be distinguished easily from the vowels or regarded as a member of its particular phoneme group.

When the uvula is not sufficiently long or flexible to assist the pharyngeal muscles in excluding most of the vibrating column of air from the resonating chambers of the nasal fossae and the nasopharynx, we get the familiar symptoms of rhinolalia aperta. Its nasal quality is characterized by a predominance of relatively few and somewhat low-pitched partials. Vowels are so altered that the fine discriminations between neighboring phonemes in the acoustic spectra are lost and high-pitched consonants (all of which are made by oral emission) are replaced by low-pitched nasals. The transition from phoneme to phoneme is so blurred that speech is hardly intelligible.

The texture of the lining of the walls of resonators possibly dampens some overtones, leaving others which appear to be accentuated in the sound-complex which results. Soft surfaces deaden the high frequencies and produce a mellow quality dominated by low partials. Hard surfaces produce brighter or clearer tones in that they accentuate these higher partials. This observation is significant in answering the question, "What is the best material for obturators?" The size and shape of the hard palate, which acts as a sounding board, probably have much to do with the quality of voice. In view of the fact that the muffled and indistinct speech of rhinolalia aperta is characterized by lower partials, a resonator which contributes higher ones to the sound complex would be desirable for increasing brilliance and balance in tone quality. Nevertheless so many other factors more potential in selecting frequencies are operating simultaneously that the degree of influence of the texture of the lining of the cavities is probably very small.

The size and shape of the aperture at the fauces probably make a considerable difference in the quality of tone. A small opening increases the influence of the nasopharynx and is frequently found in persons who have high-pitched, thin timbre. A wider opening gives low, rumbling, and sometimes excessively loud speech similar to that found in rhinolalia aperta.

A fairly wide oropharynx and nasopharynx unobstructed by growths also give a predominance of lower partials when the laryngeal sound complex is produced without undue constriction of laryngeal and pharyngeal musculatures. When the pressure of the vibrating column of air is directed toward the nasopharynx, we get the dull, colorless quality typical of rhinolalia clausa. When constriction of the phonating musculatures accompanies nasopharyngeal resonance, the so-called nasal twang results. Teachers of speech are particularly vigorous in efforts to eliminate twangs not only because of their undesirable emotional effects upon the listener but also because they indicate an unhygienic use of the mechanism.

A small amount of really nasal resonance adds brilliance and interestingness to tone color and is one of the public speaker's most valuable means of attracting favorable attention. In rhinolalia aperta the lower partials of the nasopharyngeal resonance are so loud that they minimize the effect of the high ones resulting from the nasal fossae; consequently large apertures at the turbinates are considered desirable conditions for good speech. Obstructions to the nasal fossae give the quality of tone characteristic of rhinolalia clausa.

The best type of larynx for purposes of phonation is one in which either the thyro-arytenoid folds are long, moderately rounded, freely movable, and provided with free margins. If the folds are very sharp edged, the sounds emitted are harsh; if they are more rounded, the sounds may be mellow. Husky quality is given to the voice when pathologic enlargement of the ventricular bands is present. Weak voice sometimes is caused by insufficient elasticity and tonicity in the thyro-arytenoid muscles.[1] The best of orthodontic treatment and the most careful speech training will not remedy such conditions.

Speech is not a static phenomenon but a process and the result of definite actions performed by the organs of speech. Moreover it is an 'overlaid' function or a function superimposed upon those organs. These organs have a wide range of possible movements which will produce phonemes suitable for arousing desired speech behavior. In fact, perhaps no mechanism can produce two successive phonemes acoustically identical. The fluency and accuracy of speech, two of the most important of its psychologic qualities, are dependent upon the blends of such permissible variations. These fine distinctions mean nice coordination. Phrasing, the basis of all coordinate motor performance, is especially important in speech, for upon it depends the meaning of the language code and its context. For these reasons agility and precision of muscular performance are a sine qua non in good speech.

Any appliance placed in the resonating cavities for orthodontic reasons will affect this motor agility to some extent and consequently reduce the possibilities for precise performance.

That persistent question, "What type of appliance will give best orthodontic and speech results?" is, of course, a complex one and can have no adequate single answer. Before any decision can be made we must take into account the age at which the treatment is to begin, the length of time the appliance is to be used, and the extent to which the appliance will interfere with the action of the tongue.

Should treatment begin prior to the age of seven or eight years, we must pay considerable attention to the effect of any appliances or treatment upon the nice coordinations required by the muscles of the tongue and the larynx. One of the most dreaded difficulties which speech teachers face is that of stuttering. By this we mean an intermittent hesitation in speech accompanied by more or less severe spasmodic cramps of the muscles of the larynx. The sufferer is able to make articulations with the tongue, but cannot follow them or precede them by sounds which require the operation of the thyro-arytenoid muscles. Practically 90 per cent of those children who are going to have such difficulties have exhibited other tendencies in this respect before they are seven. It seems reasonable to infer that the presence of any appliances or the administration of any treatment which would interfere with the very complex muscular operations involved would be extremely unfortunate at this time.

All the motor processes of speech are comparatively poorly established until adolescence when the maximum growth in the larynx will have taken place. The kinesthetic cues which play an important rôle in speech training will be confused and nullified by frequent alterations of the freedom and facility of the tongue muscles.

Various tactual motor stimuli must also be given a chance to play their rôle in speech production. Ordinarily speaking, wires which are placed lingually rather than labially are much more of a hindrance to precision in speech.

Next to the factor of muscle tonus the most effectual means of making correct sounds is the ability to point the tip of the tongue. This means that it must be given considerable room in the front of the mouth; otherwise the blade rather than the point will make the contact or the back of the tongue will have to fall so low that lateral emission will result, and three or four low pitches will be the characteristic of the subsequent vowels rather than the two more or less high pitches characteristic of these plosive or sibilant sounds. The presence of appliances designed to control undesirable tongue habits, such as sucking the cheek or sucking the thumb, etc., also produces low-pitched sounds. I seriously question the advisability of trying to teach precision in speech or distinct utterance when such appliances are present. There are, however, those who disagree with me, and in certain special cases it has been demonstrated that such disagreement is warranted. In the post-treatment care of patients in whom the form of the arches has been modified and lingual arch wires attached to bands or spurs have been used as retention devices, we also have conditions which interfere with precision and tongue contact. Skeleton vulcanite plates designed to place such arch wires sometimes result in similar difficulties. More frequently we get speech characterized by very heavy "sh" and "zh" sounds and "s" sounds which are unvoiced. The very low pitched whistles, which really are a combination of several s's probably due to an escape of air from several apertures in the plate near the normal position for the blade and the tip of the tongue when the individual is not speaking, are responsible for this chorus of sounds which otherwise might have been clear and distinct. I do not think that faulty construction of the appliance is to blame for this condition. As I understand it, adhesion and

atmospheric pressure can best perform their part in retention when there are prominent ridges to prevent side slip, when the saliva contains a small amount of mucin, when there is more or less uniform pressure of denture at all points on tissues covered by the device, when the area to be covered by the denture is as large as possible, and there has been prevention of air leak at the edges. When these conditions are not met or cannot be met because of the peculiarities of the texture in the lining of the mouth or because of the shape of the arches, we cannot expect to eliminate acoustic conditions which will produce several sounds at once each with almost equal intensity.

Plates attached to the mandibular teeth will not seriously interfere with mobility of the tongue and muscles of the larynx unless they press upon the lingual frenum. In such a case the frenum might be altered to allow more adequate tongue action.

In case of cleft-palate, speech training must be adapted to many factors, including the nature of the structure of the speech mechanism, the appliances used to compensate for deficiency in speech ability and the effect upon hearing that such throat conditions usually bring. In many cases in which operative treatment has been postponed and infection has set in, impairment of hearing takes place. In fact, I have examined few cases of cleft-palate speech in which there has not been significant loss of hearing. Whether the cleft-palate is responsible for the condition is questionable. Such a situation is serious in speech training, for usually more can be accomplished by a program of "listening technics" than one devoted almost entirely to the training of the muscles of the soft palate and pharynx.

The rhinolalia aperta, which results from cleft-palate is, phonetically speaking, a blurring of the relatively low pitches characteristic of vowels, especially of the so-called back vowels. In trying to make them more distinct we usually use the highest pitch level compatible with comfort and hygiene of the speech mechanism. Precision in pronunciation of plosives is largely dependent upon two technics, the direction of air through resonators of the pharynx and mouth, and proper contacts of the muscles of articulation. Since such conditions are very difficult to obtain in cases of cleft-palate, one must rely largely upon the ear of the pupil to make these adjustments.

Special modifications of habits of inhalation and exhalation are often indicated in cases of cleft-palates. The sniff through the nose, in cases in which the openings at the nares and turbinates are large, sometimes results in tension in the pharynx following the impact of too much cold, dry, and dust-laden air upon the mucous membranes. Where there is a stenosis of the nares, the natural ill results of mouth-breathing are to be expected. Many speech teachers encourage mouth-breathing because of the action of the palatal muscles involved. I have found that unless one takes great care, one will teach a type of inhalation which will make clear, pleasing speech impossible.

If orthodontists can devise means of promoting easy, quiet inhalation rather than gasping breaths, they will have performed one of the most valuable services speech correction needs, for gasping is more largely responsible for poor vocal hygiene than any other single speech habit.

This essay has hardly more than hinted at some of our mutual problems; nevertheless I trust it has impressed you with the need of cooperation between orthodontists and speech correctionists. We realize that the business of guiding individuals to the realization of their greatest possibilities for healthy, happy, useful living is an extremely complicated one and requires the united effort of home, school, and state. I understand that just what part the state should take in providing health service has not been agreed upon by professional groups; nevertheless teachers of speech correction are determined that they will not cease their efforts to secure necessary otologic, medical and orthodontic treatment for children under their tuition until *some* responsible social agency has demonstrated its willingness and ability to see that such care has been provided.

REFERENCE

1. Negus: Mechanism of the Larynx.

DISCUSSION

Dr. Letita Raubicheck.—Since I am in almost complete accord with all the general statements made by Dr. McDowell, my discussion of her paper will not be a refutation so much as it will be an underlining of those phases of her speech which seem to be of particular importance to the members of this Society.

May I first agree with Dr. McDowell in her tribute to the importance of the work which you are doing, and extend to you from the department which I have the honor to represent our grateful appreciation for the valuable work which you are doing here in New York City for the children for whom we are jointly responsible. We were tremendously interested in the statement of your President in his opening address, in which he looked forward to an extension of the scope of your work through the medium of reducing the cost. That is, of course, for us a very practical problem. So many of our cases need you; so few of them can afford you as yet.

In dealing with other phases of Dr. McDowell's address, I should like to say that while every one surely agrees that there is a close relationship between malocclusion and poor speech, one of the phases of the matter that interests us especially is why malocclusion does not inevitably produce poor speech, and what phases of malocclusion are, from the point of the speech correctionist, most serious.

I think there is probably a difference in our emphasis on this matter because of our difference in aim. Orthodontists have perhaps a broader aim in this problem. They want a perfect occlusion not only because it improves speech, but also because it improves appearance and because it improves health, aids in the mastication of food, and so on, and because of the social implications of those factors.

We are interested primarily in producing the right acoustic patterns, so we are interested not so much in the process as in the result. Therefore, any form of the jaw which permits the correct acoustic patterns without a marked and conspicuous tic is for our purpose a good occlusion. That, I am sure, differs from the orthodontist's definition considerably.

Perhaps it would be of interest to tell of the study we made last year of 200 of 13,000 lispers, in which we are trying to study possible causes for the lisp. We found that 90 per cent of these 200 showed a marked malocclusion, yet at the end of the period of treatment 75 per cent of that 90 per cent showed either complete correction or marked improvement. We found, moreover, that of the 25 per cent remaining, only 5 per cent showed an inability to make the sound at any time, which we took to be the criterion of mechanical maladjustment.

It seemed to us not only that the speech correctionist is interested in the perfection of the mechanism itself, but that the determining factor from our point of view is more relationship than actual formation, admitting of course that a certain fundamental perfection of the form is necessary.

Perhaps an example will make that clear. A short foramen or a high palatal arch are both handicaps to good speech, but a combination of the two, that is, a short foramen with a high palatal arch, is very much more of a handicap than a short foramen with a low palatal arch, which would permit, for instance, the tip of the tongue to reach the high palate for the production of the sound of "t" or "d".

We are also interested in the relationship between the size of the jaws and the size of the buccal cavity, because frequently we find that a slight modification of the sound is very much amplified, just as certain of the tones of my voice are being amplified by this mechanism here. That we find to be important.

Perhaps one of the most helpless feelings we as speech correctionists have, results not so much from a malocclusion as from bad relationship. If there is perfect occlusion in a small jaw, with a very large tongue, there is almost nothing you can do to get the tip of the tongue out of the way of the teeth in the production of sibilants, and yet one of the things we must have is a clear, free-tip tongue if we are not going to have blurred sibilants.

Of the types of malocclusion which we find most serious, I wish to differ very slightly with Dr. McDowell. We do find, of course, that any marked difference in occlusion is liable to have a very marked effect on the production of the sibilants and some of the frontal consonant sounds. We do find, however, that the undershot jaw more regularly produces a modification of the sibilants than the overshot jaw.

The most serious, I suppose, is the open-bite. We find, however, that a dentition which is not in itself so serious from the orthodontist's point of view is frequently a very great factor in malformation of some of the sounds. For example, a single tooth in the mandible which interferes with the free lifting of the tongue tip may have a very marked effect on speech, and yet, from the orthodontic point of view, would be relatively unimportant. If there seems to be too many teeth in the mouth, so that the free movement of the upper lip is impeded, no matter how straight the teeth are we find difficulty in articulation.

These are some of the differences in emphasis, a difference in point of view in regard to a phenomenon with which we are both concerned.

I should like to end my discussion by asking a question. First, is my observation valid that there is a greater proportion of malocclusion in large cities than in rural districts; that New York and the metropolitan area are particularly rich in cases of malocclusion, and that the corn belt seems to produce the best jaw formations? That is my personal observation. I am wondering whether I have been right in sizing up such a trend. If I am right, what is the reason? Is it a question of diet or is it a question of racial trends? What are the reasons?

Dr. Elizabeth D. McDowell.—The first question is one about when the voice changes at puberty. Some one asks whether we change our technic in treating a case at puberty.

Yes, we do, sometimes. Sometimes we have no speech at all in cases of very bad distribution of modulation of what we call resonance. Sometimes misuse of the mechanism at that point leads to enlargements or swellings of the vocal bands.

The great amount of growth that comes at puberty comes all of a sudden. It does not come over a period of three years, but probably comes very much as does any other growth, in spurts.

Sometimes we give low singing tones. Sometimes we give high singing tones in trying for flexibility. It all depends on many qualifications and reservations: the condition of the larynx at that time, whether there is a tendency to much hoarseness, a tendency to much falsetto voice, and whether there are great gaps of resonance which indicate enlargements on the vocal bands, or even the ventricular bands.

Here is a question about a case in which the uvula was removed in order to prevent the recurrence of colds. Some of the finest voice quality and most distinct speech I have ever heard has been obtained by people who have no uvula.

We had three outstanding pupils who came up for reading contests, and were particularly commended for their voices. One of them had a bifurcated uvula. One had had the uvula removed at the tonsil operation. The other had quite a long uvula.

GROWTH OF THE JAWS AND THE ETIOLOGY OF MALOCCLUSION

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(Continued from page 39, January)

CHAPTER VI

ESTIMATION OF THE RELATIVE RATES OF GROWTH

At present we do not possess sufficiently accurate data to determine the relative rates of growth of the maxilla and the mandible in the three dimensions of space. Inasmuch as we are mostly concerned with those individuals who are in need of orthodontic treatment, a knowledge of the rates of growth prior to the development of the dental irregularity and during the period of its correction is of utmost importance. It is very likely that the necessary information in the form of accurate measurements of a large number of living individuals is forthcoming, but at present we can only estimate the relative rates from an extended study of a collection of North American Indian skulls, which is not representative of the modern type we are called upon to treat. Nevertheless, the knowledge gained through this study is sufficiently accurate to allow certain general deductions, which, so far as the mechanism of growth is concerned, are equally applicable to the more modern types.

The measurements for this analysis were taken from Hellman's work[1] on the "Changes in the Human Face Brought About by Development." A study of the figures will show that these measurements were accurately made; therefore they are acceptable in a quantitative analysis of growth. The purpose of the original investigation was to trace the growth changes in the human face throughout the entire span of life, while the present analysis has for its final object the determination of the relative rates of growth during the most active developmental period. For the proper understanding of orthodontic problems both these studies are important, but a definite knowledge of the relative rates of growth becomes a necessity in the study of the development of dental irregularities.

In order to point out the differences in the methods of analysis, I shall review briefly the method employed in the original investigation. Quoting in full from the original article, "the material for the study was supplied by the American Museum of Natural History in the form of a collection of skulls of North American Indians, excavated by Earl H. Morris in Arizona. It is estimated that they date back more than two thousand years, and they appear to have belonged to a very homogenous group. The collection contains skulls of all ages from infancy to senility, and it consists of seventy-eight complete skulls, fourteen crania without mandibles, seven clavria and nine mandibles,

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in all, one hundred and eight specimens. Thirteen of the complete skulls were not classifiable, but of the sixty-five skulls studied, forty-two dentitions or 65 per cent are in normal occlusion, and the remaining twenty-three skulls are in the three classes of the Angle classification of malocclusion.

"For proper study the material had to be arranged in groups. For this purpose several distinctions had to be eliminated. The first was due to sex differences. This was discarded, because even in adult specimens sex distinctions cannot be made with unmistakable accuracy on skulls alone. But when infant skulls are studied, the distinction becomes more difficult and less accurate.

"The other elimination was that of chronologic ages. There is always a great difficulty met with when chronologic ages of skeletal material are to be determined. This problem is speculative at best, and when ancient skeletal material is concerned it becomes an impossibility. For this reason the material was grouped in accordance with certain stages of development. This can be done more easily and more satisfactorily if the dentition is used as a basis. The development of the dentition bears unmistakable evidence of certain periods of life that are closely associated with the manifestations of other physiologic phenomena. These periods were determined entirely by the conditions of the dentitions, and were named the stages of development. The stages of development decided upon will be referred to by the use of Roman numerals as follows:

"Stage I designates that period of early infancy before the completion of the deciduous dentition.

"Stage II designates the period of late infancy at the completion of the deciduous dentition.

"Stage III designates the period of childhood when the permanent first molars are erupting or have taken their positions, in addition to which some or all of the deciduous incisors have been lost and are replaced by their permanent successors.

"Stage IV designates the period of pubescence when the second permanent molars are erupting or have taken their positions, in addition to which some or all of the deciduous canines and molars are lost and are being replaced by their permanent successors.

"Stage V designates the period of adulthood when the third molars are erupting or have taken their positions.

"Stage VI designates the period of old age when the occlusal surfaces of the molars are worn off to the extent of obliterating the pattern of the grooves.

"Stage VII designates the period of senility when at least half of the crowns of the teeth are worn off, in addition to which, some, most, or all of the teeth have been lost.

"By the adoption of this classification the difficulty of the chronologic age was eliminated, and definite landmarks in development were established. However, in the living, some of the stages of development may be translated into terms of years. The records of 392 New York individuals were sorted out in the same manner as the skeletal material, and an estimate was made of the chronologic ages." The result was as shown in Table IV.

TABLE IV

TABLE SHOWING THE AVERAGE CHRONOLOGIC AGES OF THE PHYSIOLOGIC STAGE GROUPS (FROM HELLMAN)

STAGE		NUMBER	AVERAGE AGE	STANDARD DEVIATION
I		None	–	–
II	Males and females	13	6.00 years	1.13 years
III	Males	85	9.98 years	1.76 years
	Females	89	9.80 years	1.66 years
IV	Males	74	14.98 years	1.76 years
	Females	121	14.44 years	2.00 years
V	Females	11	22.45 years	1.83 years

This classification affords a convenient means of grouping skeletal material, but it is to be noted that the physiologic age groups must necessarily include individuals whose chronologic ages differ as much as four years in Stages II, III, and IV, and considerably more in Stages V, VI and VII. This follows directly from the definition of the stages. If we take, for example, Stage II, which is the period of late infancy at the completion of the deciduous dentition, the average age of six years is about four years too high. The deciduous dentition is completed at the end of the second year on the average, and a child at two years of age whose deciduous dentition is completed belongs to Stage II. Similarly, a child of six years whose permanent first molars have not yet erupted and whose deciduous incisors have not been lost also belongs to Stage II, in accordance with the definition of that stage. It is clear that from the point of view of growth and development these two children cannot be considered to represent the same physiologic group. The same reasoning applies to Stages III, IV, and V. Thus it appears that the several stages do not represent a physiologic state attained during development, but rather an interval of time during growth which may be as much as six years in individual instances. The definitions of stages do not convey this conception. Regardless of the statement by Hellman, "that the chronologic ages and physiologic stages are remotely related, because certain stages in development are reached by some individuals much earlier than by others," it still remains necessary to determine the exact time at which the stage in question was reached. If the exact time is not known, the figures tabulated under the various stages represent only the average dimensions of cases between two adjoining stages, which must be quite different from the values sought. Furthermore, the classification is based on the appearance of certain teeth; and, since growth continues after the appearance of such teeth, our conclusions regarding accelerations and rates of growth must be only a rough estimate. To state this another way, it may be observed that when we speak of rates of growth and accelerations of growth, we imply the time rate, so that time must necessarily be a factor. If time is a factor, then the time interval between the various stages must be carefully noted; otherwise we lose all claims of comparison between the various stages, so far as the rates of growth are concerned.

"The table further shows that sex differences may be entirely ignored when we are dealing with ancient skeletal material. The average age differ-

ence between males and females of the same stage is only a fraction of a year, and it is very much smaller than the error which may arise from the classification. If a study is made on living subjects this should also be taken into consideration."

In discussing the rates of growth Hellman states that "weight is a function of size, and increase in size is what really constitutes growth. Therefore, the greater the size of the organism the heavier it will be. If it is desired to know how much growth has taken place in how long a time, all that is necessary to do is to obtain the weight as different time intervals and the answer is furnished. . . . The face of man, however, cannot be weighed. If we substitute the measurement of size for that of weight, like results may be obtained. This, however, is not so simple. The measurement of weight secures the quantity of bulk. Size can only be measured in one direction. In order to obtain an estimate of bulk it is necessary to obtain measurements in three directions, namely, height, width and depth, of the same organism or structure. The study of the development of the human face, therefore, had to be pursued on this basis. But these measurements had to be considered also in relation to time. It is on this account that the stages of development outlined above had to be adopted so as to be able to estimate what changes occur from stage to stage.

TABLE V

SHOWING CHANGES IN DIMENSIONS OF TOTAL FACE HEIGHT AT THE DIFFERENT STAGES OF DEVELOPMENT

STAGE	NUMBER	MEAN IN MM.	STANDARD DEVIATION IN MM.	ABSOLUTE INCREASE OR DECREASE IN MM.	PERCENTAGE INCREASE OR DECREASE	PER CENTAGE INCREMENT SUPERPOSED
I	7	66.27	3.42	—	—	—
II	9	77.80	6.30	11.53	17	
III	6	88.35	6.85	10.47	14	31
IV	6	110.00	6.45	21.53	24	55
V	13	116.90	9.70	6.90	6	61
VI	20	121.00	6.70	5.10	4	65
VII	13	108.10	5.55	–12.90	–11	54

"In order to gain an idea of bulk, the quantitative analysis of the face had to be made by three sets of measurements, namely, height, width and depth. For this purpose the landmarks used in anthropology were employed. But when these did not suffice others had to be supplemented. These distances measured will be described with the curves." The measurements were recorded in suitable tables, and the percentage increase or decrease from stage to stage was calculated. Table V shows such a table for the total face height. In explaining these measurements I shall again quote from Hellman. "What do these measurements show? They show a good deal. Examine, for instance, Table I [Table V]. This table represents the measurements of the total height of the face, taken from nasion to menton. But besides giving the height of the face there are many other facts recorded in it.

"First, it gives the stages of development when the measurements were taken (Column 1). Second, it gives the number of individual specimens belonging to each group (Column 2). Third, it gives the mean (average) in millimeters of each group of measurements (Column 3). Fourth, it gives the standard deviation or range of variability of the individuals within the group (Column 4). Fifth, it gives the difference in millimeters between a certain group and the one preceding it. Last, it expresses the differences—increase or decrease—in per cent. While it is a very simple matter to note that these figures point to certain changes taking place from stage to stage, it is not quite so simple to note just what they are. The last column helps to clear up this matter and to point out just how these changes occur. The reason for expressing growth changes in per cent is consequently obvious. A tall individual, for example, adding one centimeter to his stature in a given time will be growing slower than a short one adding the same height in the same length of time. The percentage additions therefore give the relative rate of growth in a given interval of time.

"It is, therefore, quite convenient and very profitable to have this column appended to any table presenting measurements of growth. It helps to illustrate what has happened or is happening at a glance. For example following the sixth column down, it is seen that from I to II, 17 per cent has been added to the total height of the face. In the next stage another addition is made, but this one is less than the previous one. The third addition of 24 per cent is the largest increase in face height. Then follow two more additions, one smaller than the other. The final figure then shows an actual decrease. There are then several important facts recorded in this column.

"1. The height of the face increases as the individual passes on from stage to stage, in the course of time until old age is reached, after which there is a decrease in height taking place during senility.

"2. This process of development is accompanied by accelerations and retardations in the rate of growth. There is an acceleration of growth during the period of late infancy (I to II) which is followed by a period of retardation during childhood (II to III).

"In other words, the total face height increases more during the interval between Stages I and II than it does during the next following it. A second and most pronounced acceleration then sets in again during the period preceding puberty (III to IV) to be followed by a gradual retardation in rate of growth until senility.

"Another way of emphasizing these facts is by means of graphs. If we plot the percentage against time, we get a curve that indicates percentage additions in growth. The conventional form of plotting percentage additions assumes a form which, in my estimation [Hellman's] fails to convey the idea I have in mind. I have, therefore, digressed from the conventional custom, and constructed a graph by adding on or superposing the percentage additions Column 7 [Table V] to each other as the organic structure continues to grow, instead of plotting each percentage increment from a base line." **Fig. 10** shows such a curve, which represents the digression from the conventional method.

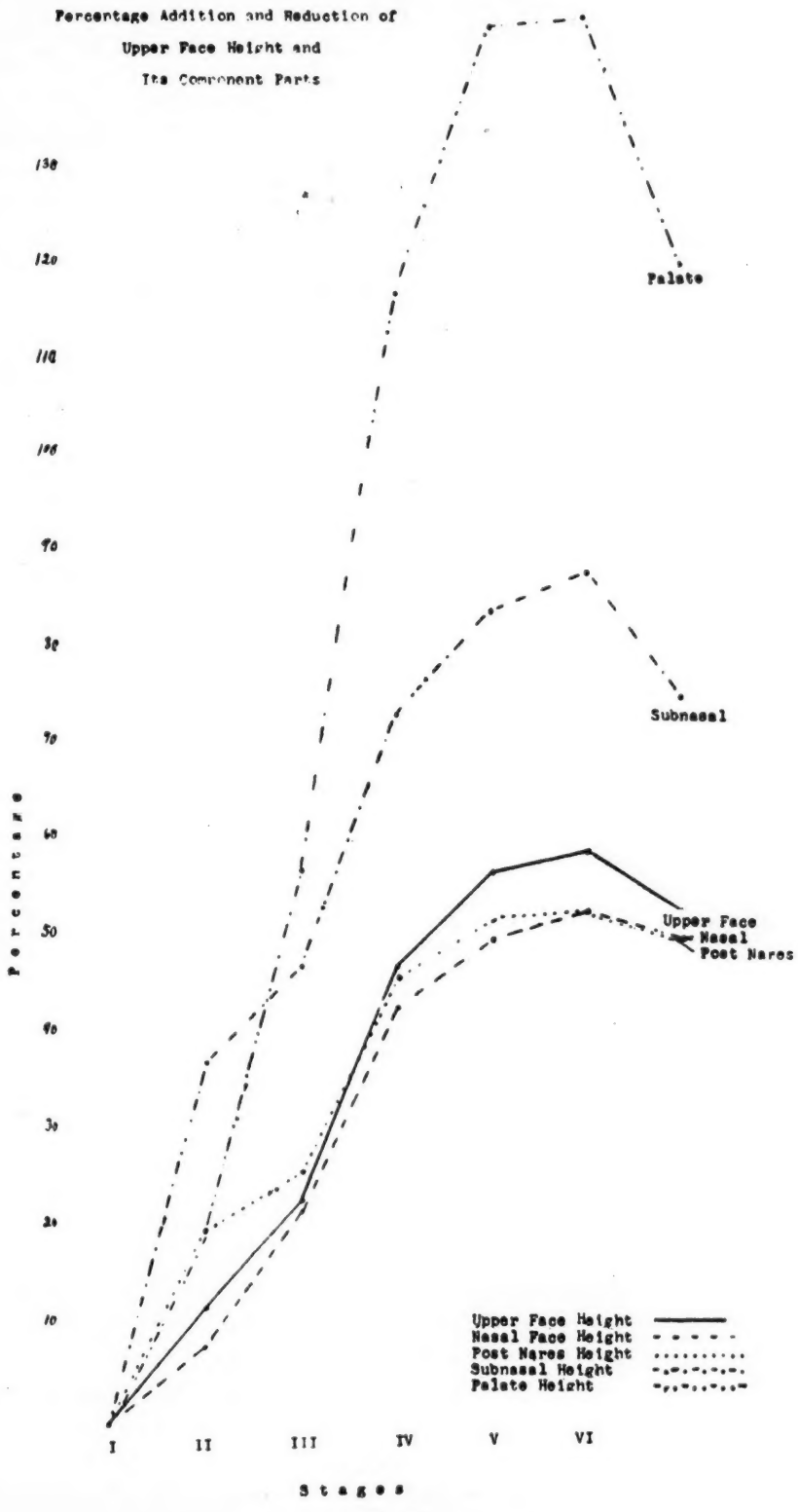
Percentage Addition and Reduction of
Upper Face Height and
Its Component Parts
Palate
Subnasal
Upper Face
Nasal
Post Nares
Upper Face Height
Nasal Face Height
Post Nares Height
Subnasal Height
Palate Height
Percentage
I
II
III
IV
V
VI
Stages

Fig. 10.

At this point, certain technical questions arise which may have an important bearing on the conclusions arrived at by Hellman. From his descriptions it appears that the ultimate object of his studies is to determine the physiologic time rate of growth of the face in the three directions of space. In this determination there are two important elements which must be considered: (1) the element of time, and (2) the change in dimension. The rate of growth is the ratio of the "change in dimension" to the "change in time," which may be expressed as follows.

$$\text{Rate of Growth} = \frac{\text{change in dimension}}{\text{change in time}}$$

and similarly

$$\text{Physiologic Rate of Growth} = \frac{\text{change in dimension}}{\text{change in physiologic time.}}$$

It is clear that in order to give a meaning to these expressions the changes must be expressed in appropriate measurements, the changes in dimension in units of length, and the changes in time in units of time. Since the measurements change only a very small amount during growth over a long period, the unit of length should be a small unit such as a millimeter, and the unit of time a larger unit such as the year, so that the rate of growth would be expressed in millimeters per year. These units of length and time are standard and uniformly equal. When we inquire into the nature of the physiologic time unit, it becomes at once apparent that it is not adequately defined. Since it is a measurement of duration, it must bear a constant relationship to chronologic time. But granting that no such relationship exists, and that physiologic time is something entirely different than chronologic time, it still becomes necessary to define the "unit of physiologic duration" so that the different physiologic time intervals may be adequately expressed. Without a properly chosen physiologic time unit, the physiologic rate of growth cannot be determined. Furthermore, proof is lacking that the physiologic time intervals between the adjoining stage groups of Hellman are equal. In the interpretation of the rates of growth, *these intervals cannot be considered equal unless they are proved equal,* although they were so considered. Until the physiologic time unit is properly defined, the chronologic time will give more reliable information. It may be noted here that Brash used the chronologic ages in his analysis of growth,[2] which was based on Franke's measurements.

The changes in measurements must be also properly expressed. The question arises whether it is permissible to express growth changes in percentages, and whether "a tall individual adding one centimeter to his stature in a given time will be growing slower than a short one adding the same height in the same time." This cannot be arbitrarily decided, for it depends entirely upon conditions. It is necessary to know how the increase in size took place. Since growth is the result of cell activity, we may consider two conditions which may illustrate this satisfactorily. Let it be assumed that one of two bones of the same size increases in length as the result of cell activity at one of its ends, and the other increases in length on account of interstitial cell activity throughout its entire length. If these two bones add equal amounts to their length during the same time, then the one which grows at its end

must have a greater cell activity. The cell multiplication and any process which is the result of cell function must be more rapid in the one which grows at one end than in the other bone, in which a slow transformation of the entire bone may produce the same quantitative result.

It follows, therefore, that if two bones of unequal length grow at the same rate of interstitial cell activity, then the additions to the shorter one will be less than those to the longer one, and the additions may be properly expressed by percentages, which must necessarily be equal. If, on the other hand, the additions to the two bones are the same during the same length of time, then the percentage increase in the shorter one will be greater and its rate of growth will also be greater. This is the reasoning on which Hellman's analysis is based.

We know from Brash's experiments, however, that the growth of the mandible and the maxilla is a result of surface deposits and absorptions of bone, and that the increase in the height of the face is accomplished mainly by additions to the upper and lower alveolar edges. While interstitial transformations also accompany these changes, they are only secondary to the main processes of growth, and they have no direct effect on the increase in size. The rates of growth must be differently interpreted under these conditions. If a dimension of a bone increases on account of cell activity at one end, then the size of the bone cannot have any bearing upon the rate of increase. In such instances the rate of growth must be measured by the amount of deposit at the site of growth, and the *intensity of cell activity is directly proportional to the amount of deposit.* If growth on one end is expressed as a percentage of the size of the bone, then the intensity of cell activity will be obscured; and although the rate of new additions may be the same to bones of different sizes, the rate of growth of the smaller bone will appear greater, implying a greater cell activity, which is erroneous. It is important to express the rates of growth in a manner which will indicate the intensity of cell activity at the various sites of growth. This will enable us to draw conclusions which will directly influence our conception of the development of malocclusions and jaw deformities.

Since the interstitial changes in the bones of the face during growth are only secondary to the main processes of growth, it is more advantageous to express the changes in dimension in terms of actual additions. To express these changes as percentages of size will lead only to an obliteration of important physiologic phenomena which is so important for the proper interpretation of the etiology of malocclusion. It may be further pointed out that by using the percentage increase of size we may encounter other difficulties. Percentages are meaningless unless it is specified of what they are percentages. This is especially true when the percentages are added. If we turn to the last column in Table V which is headed "Percentage Increments Superposed," we note that the 31 per cent appearing in Stage III is obtained by the addition of the 17 per cent increase from Stage I to Stage II, and the 14 per cent increase from Stage II to Stage III. Now it is clear that while the percentage increases from stage to stage are definite percentages, addition destroys their

meaning. The resulting percentage is neither 31 per cent of the total face height at Stage I (66.27 mm.), nor is it 31 per cent of that dimension at Stage II (77.80 mm.). The successive additions of percentage increases bring about further errors, and all superposed percentages in the last column are distorted. In this particular instance the percentages can be added only if they are referred to a common base; otherwise the figures are meaningless.

If we place the stages proper distances apart consistent with time or age, we obtain entirely different curves. While these curves are not absolutely true, they give a better conception of what actually happens during growth. The periods of accelerations and retardations are more definitely marked, and the fact that smooth curves can be drawn through the several points shows that growth is gradual and that no sudden spurts occur.

In these curves the ages of the specimens were used rather than the stages. These ages were determined by the definitions of the various stages, and then compared with the averages that Hellman gave for the living. *The ages are too low for the groups of individuals represented by the stages,* but they are consistent with the definitions. The curves would be exactly the same as shown, but they might be displaced several years to the right if the proper ages were known. The conclusions, however, are not affected. It was thought advisable to adhere to the definition of the stages. Instead of percentages the actual measurements were plotted against chronologic time.

In the interpretation of these curves it will be noted that, in general, growth is accelerated between Stages II and III and decelerated from Stages IV to V. By an acceleration of growth we understand a successive increase in the rate of growth. A greater rate of growth does not necessarily mean an acceleration. Thus, from Stage III to Stage IV the rate of growth is the greatest, but during that interval there is no acceleration. The periods of acceleration are of special interest to us. It will appear later that the whole individual, and therefore also the dental apparatus, may be severely affected by injurious agents during or prior to these periods of acceleration. These agents may also be operative during the period of greatest growth (from Stage III to Stage IV), but the later in life they become operative the less the injury will be to the individual as a whole, or to any one of its parts in question.

The important point to note is that these changes in the rate of growth occur, and that the majority of patients seeking orthodontic service are just going through or have just completed the period of greatest growth. From observation we know that irregularities of the teeth and malformations of the jaws are evident at an early age; and, although these may become more pronounced with further development even under favorable conditions, severe types of malformations can originate only from an early stage. We must look upon growth and development as an unfolding process. If we accept the proposition that an individual with good inheritance will develop normally under ideal conditions, then we can readily understand that the later in life an injurious agent becomes operative the less likely it is that there will be a deviation from the normal.

The study of these curves will enable us to understand better the normal mechanism of growth. From other data it is possible at present to form a conception of the deviation from the normal which takes place in certain types of malformations. These curves, however, represent only the average which may show variations from the normal; but, since the difference is slight, all deductions will be made in reference to the normal. It may be pointed out here that the normal is also an average, but of more closely related characteristics.

The curves showing the growth changes in total face height and its component parts, Fig. 11, bring out very important characteristics of the growth of the human face. We know from Hellman's descriptions that the total face

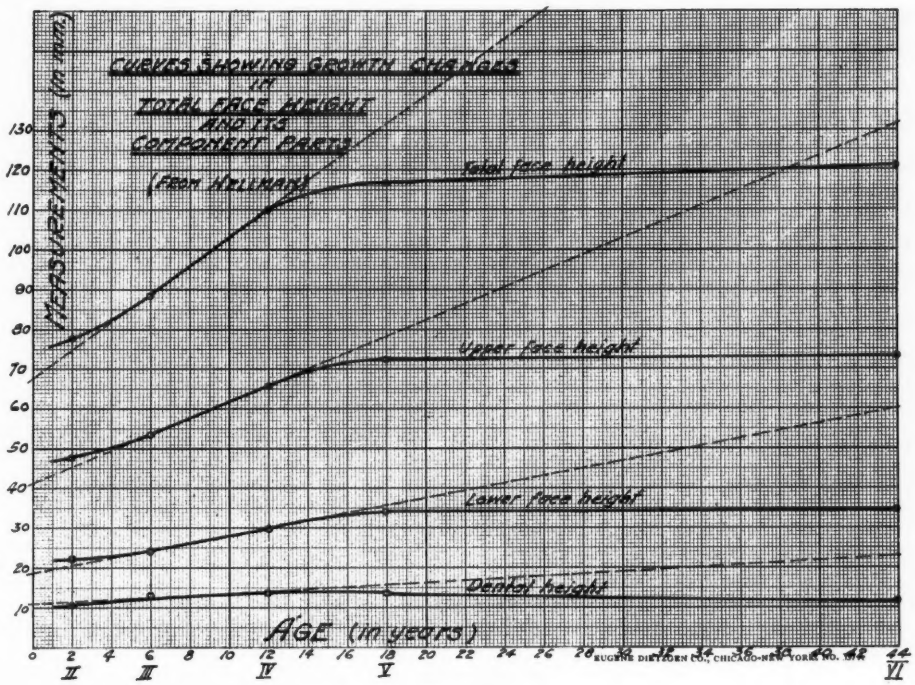

Fig. 11.

height is approximately the sum of the upper face height, dental height, and lower face height. This is only approximately true, for the measure points selected are not exactly on the same straight line. The total face height is measured from the nasion, the point at which the frontal bones articulate with the nasal bones, to the menton, the lower border of the mandible in the median plane. The upper face height is the distance between the nasion and the upper alveolar point, which is the lowest interalveolar point between the maxillary central incisors. The lower face height is measured from the menton to the lower alveolar point, the highest point of the interalveolar septum between the mandibular central incisors. The dental height is the distance between the upper and the lower alveolar points when the teeth are in occlusal contact. It is to be observed that these curves display the same general characteristics, with the exception of the curve of the dental height.

There is an acceleration of growth from Stage II to Stage III. This means that the slower rate of growth at Stage II is gradually changed to a more rapid rate, and that at Stage III it reaches its maximum. From there it continues at a uniform rate to Stage IV, after which a deceleration occurs, and the rate of growth is gradually diminished to Stage V, where it reaches its minimum value. From this point it continues uniformly at the minimum rate.

The exact nature of these curves is not known, but they are subject to the same interpretations as all mathematical curves. Thus the slope of the tangent at any point represents the rate of change of the ordinate with respect to the abscissa. In this instance the ordinate represents the dimension of the part, and the abscissa represents time (age). The slope of the tangent at any point, therefore, is the time rate of change of measurement, *which is the rate of growth.*

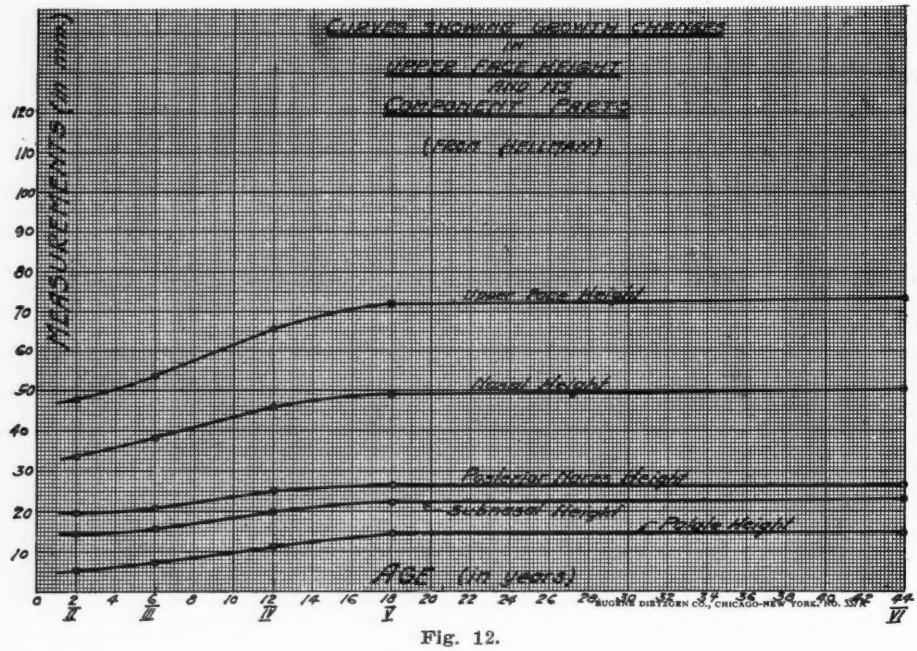

Fig. 12.

When the curve is a straight line, the tangent at any period coincides with the curve so that the slope of the curve itself is the slope of the tangent. Since the slope of a straight line remains constant throughout, the ordinate has a constant rate of change with respect to the abscissa, or in other words a uniform rate. To determine the rate of growth at any point, a tangent is drawn to the curve at that point, and from the intercepts of this tangent its slope may be calculated, which in this instance will be expressed in millimeters per year. It so happens that at six years of age the rate of growth reaches its maximum value and it continues uniformly until the twelfth year. The straight line representing this period may be produced at both ends, and from the intercepts thus obtained the rates of growth for that period can be calculated. It would be desirable to determine, in a similar manner, the rates of growth of the various parts before the acceleration occurs, but from the present data this cannot be done with accuracy.

It was pointed out before that the total face height is only approximately equal to the sum of its component parts; nevertheless the sum of the rates of growth of the component parts very closely checks the rate of growth of the total face height. The curve of the dental height shows a definite decline after the eighteenth year. This is due to the wear of the occlusal surfaces of the teeth, which according to Hellman is very pronounced at Stage VI. Thus it appears that the total face height increases during growth and that this increase is due to four different areas of growth. Two of these areas are the maxillary and mandibular alveolar edges which are responsible for the increments of the upper and lower face heights respectively. The two other areas are the maxillary and mandibular teeth which increase in length on account of the circumferential deposits of cementum on their roots. This was demonstrated definitely by Brash.

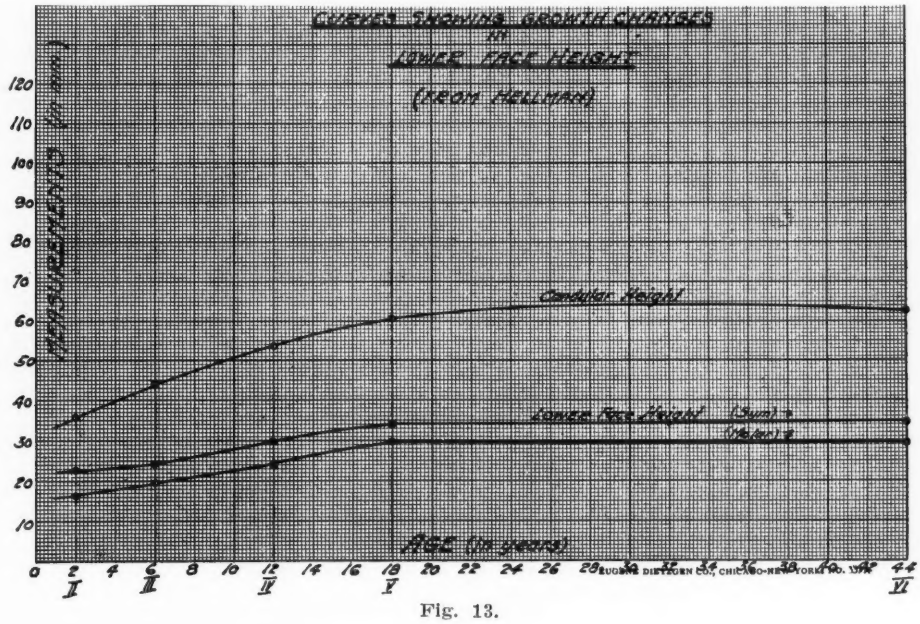

Fig. 13.

If we study the upper and lower face heights separately, we shall arrive at other important conclusions. The curves showing the growth changes in the upper face height and its component parts (Fig. 12) indicate that growth cannot be measured by measuring the increase in the bulk of a part. It will be observed that the component parts of the upper face height are the *nasal height* and the subnasal height. The nasal height is measured from the nasion to the lowest point of the anterior margin of the floor of the nose. The subnasal height is measured from the anterior margin of the floor of the nose to the upper interalveolar point. It is clear that the subnasal height represents the difference of two processes which take place simultaneously; namely, the growth of the bone from the alveolar edge, and absorption at the floor of the nose. By measuring the subnasal height we measure the difference between these processes, and the rate of change of this measurement will not give a true picture of the intensity of cell activity. For this reason it is not per-

missible to draw conclusions from the subnasal curve regarding the rate at which the growth of the maxillary bone takes place. The curve of the upper face height represents the conditions under which bone is added at the maxillary alveolar edge; therefore this is the only curve of this group which can be used for rate determination. It is interesting to note that the curve of the *posterior nares height,* which is measured from the base of the vomer to the posterior margin of the palatal process of the palate bone, and the curve of *palate height,* measured from a line at the top of the interalveolar septum between the second and the third molars on both sides to the highest point of the palate in the median line, are parallel. This means that the change in these measurements during growth is directly influenced by the difference in bone deposition and absorption. These curves also show that the interval between Stages II and III is the period of acceleration. The rate of growth or absorption reaches

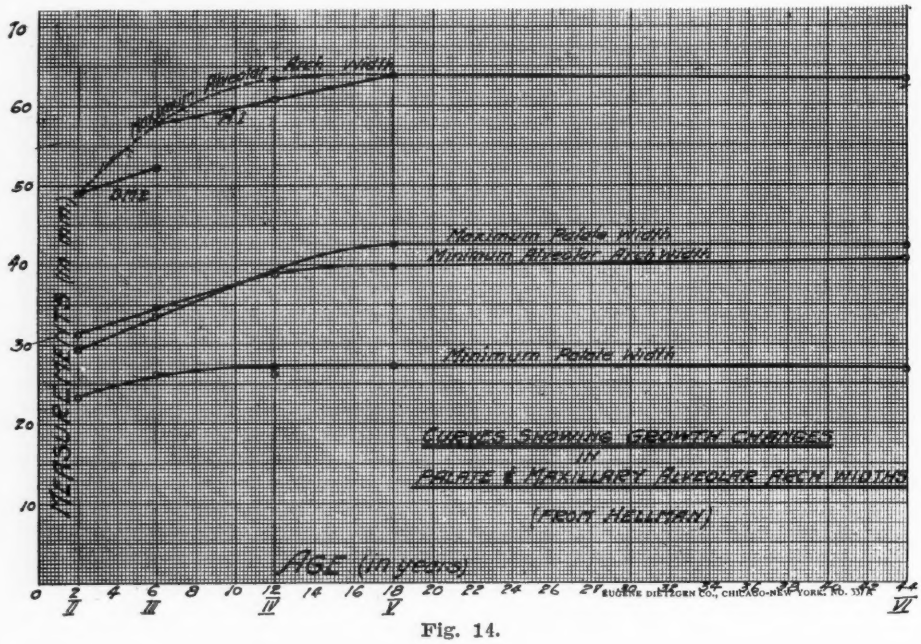

Fig. 14.

its maximum value at Stage III, and continues at a uniform rate to Stage IV where a deceleration occurs. From Stage V growth continues uniformly at the minimum rate.

The curves of the lower face height (Fig. 13) show similar changes with the exception of the condylar height, which has its maximum value at Stage II, and is subject to a slow deceleration.

The curves for the measurements of width (Figs. 14-17, inclusive) are very important to us. Hellman gives the maximum and minimum measurements of the widths of the palate, and the maxillary and mandibular alveolar arch widths. The *maximum palate width* is measured between the alveolar margins distal to the second molars, while the *minimum palate width* is measured between the palatal margins of the canine alveoli. The *maximum upper or lower alveolar width* is the widest spread on the buccal side of the alveolar process. It is to be observed that these measurements are taken more distally

at each stage, so that it becomes necessary to measure the increase in the alveolar arch width in the same region at the various stages. The curves drawn in dashes show the maximum alveolar arch widths at different regions, and the full lines indicate the growth in the region of the second deciduous molar and the first permanent molars. The *minimum maxillary alveolar arch width* is measured between the most prominent points of the canine alveoli. The *minimum mandibular alveolar arch width* is the distance between the most prominent points between the canine and the first premolar.

The curves showing growth changes in width present a different picture from the changes in the vertical measurements. First of all it appears that if a period of acceleration exists, it must occur before Stage II is reached. The growth takes place at a uniform rate from Stage II to Stage IV, and the

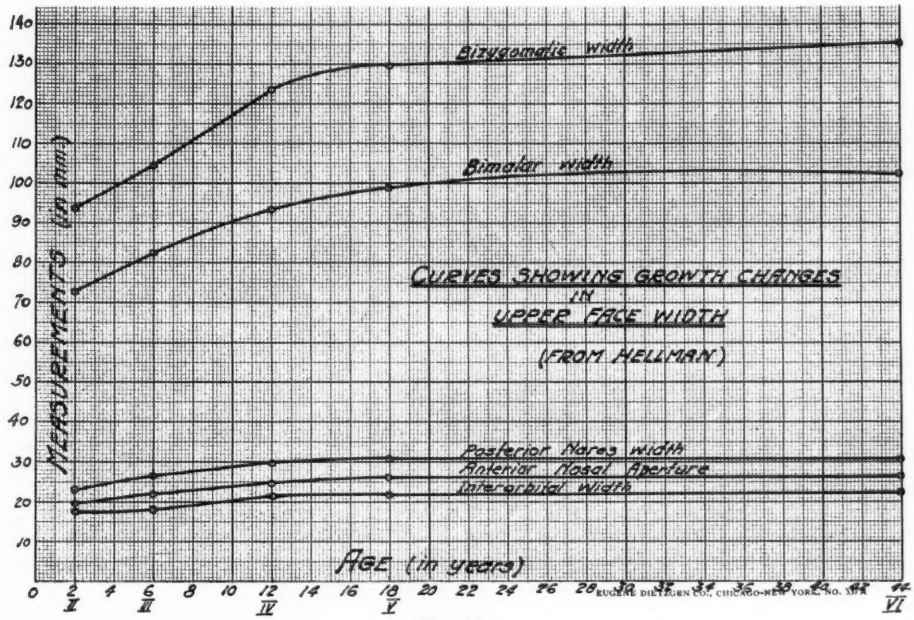

Fig. 15.

deceleration up to Stage V is followed by a uniform growth at a minimum rate. Furthermore, the maximum palate width crosses the minimum alveolar arch width (Fig. 14), which tends to show that the growth of a part does not take place parallel to itself. If we note, however, that the difference in measurements at the various stages does not exceed 2 mm., and in most instances is less than 1 mm., we shall understand that this apparent crossing of the curves may not actually occur. We shall recall that the maximum palate width is the measurement between the palatal alveolar margins distal to the second molars. Since the second molar does not make its appearance before Stage IV is reached, the measurements given for all earlier stages must be only approximations, subject to errors of 1 or 2 mm. It is also very probable that these measurements at Stages II and III were made at points too far anterior to be the actual position of the described measure points, so that a narrower part of the palate was measured.

Again, the curve for the minimum alveolar arch width is not the true curve of that measurement. Here, Stages II and III represent points in the deciduous dentition, and no allowance is made for the different thicknesses of the deciduous and permanent canines. The drawing of a smooth curve through these points was made possible by the fact demonstrated in the Wallace series that the deciduous canines are pushed labially by the erupting permanent tooth. This begins to take place at Stage II, which as it was pointed out contains measurements of individuals several years older than six years of age. If we study the curve of the minimum palate width which is the measurement between the palatal alveolar edges of the canine sockets, this contention is definitely proved. The open circle represents the point plotted from Hellman's measurements, while the blackened circle shows its

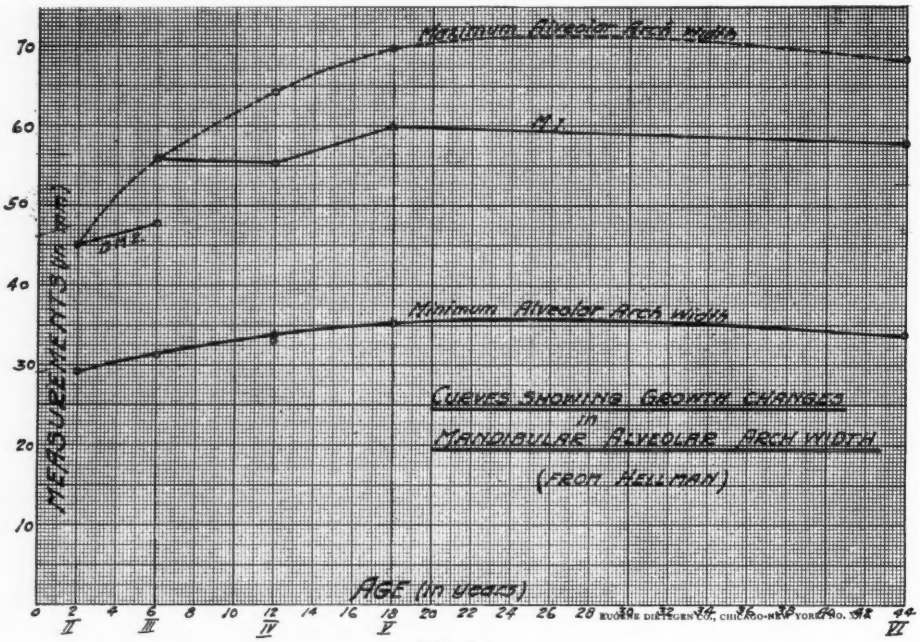

Fig. 16.

corrected position to allow the drawing of a smooth curve through the several points. It must be stated that this is not accidental, for the same condition is observed on the curves of the mandibular alveolar arch width. This correction is necessary on account of the difference in the thicknesses of the deciduous and permanent canines. The permanent canines being thicker buccolingually would show a diminished measurement between the palatal alveolar edges. Furthermore, this curve is also a composite curve of the deciduous and permanent dentitions, and the determination of the rate at which these measurements increase during growth is therefore only approximate.

A very interesting condition is to be observed in regard to the curve of the maximum maxillary alveolar arch width (Fig. 14). This measurement increases at a uniform rate in the region of the first permanent molar from Stage III to Stage V. When this is compared with the same curve for the mandibular first molar (Fig. 16), it will be seen that from Stage III to Stage

IV there is no increase in width, and if anything there is a slight decrease in this measurement. From Stage IV to Stage V the rate of increase takes place at about the same rate as in the maxilla. This is in conformity with the deductions made from the Wallace series and confirms the established fact that during development the mandible grows forward more rapidly than the maxilla. This forward growth takes place more rapidly between six and twelve years of age. During the forward growth a wider portion of the mandibular arch comes into occlusion with the rapidly widening maxillary arch, so that no growth in the mandibular molar width is necessary. This is definitely shown by these curves. The curve for the minimum mandibular alveolar arch width (Fig. 16) is a composite curve of the deciduous and permanent dentitions and it is only approximate. The blackened and open circles at Stage IV indicate the transition. The changes in the other measurements of

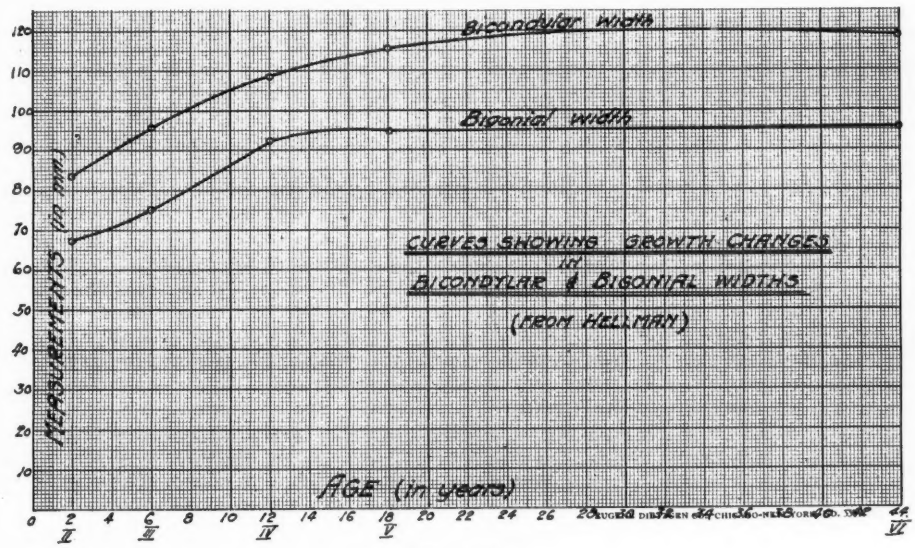

Fig. 17.

the upper face width take place at a uniform rate from Stage II to Stage IV, when a deceleration occurs. At Stage V growth reaches its minimum rate and continues uniformly.

The important difference between the measurements of the *face height* and the *face width* is that the growth of the height of the face is accelerated between Stages II and III, while no acceleration of the rate of growth of the face width occurs during that period. It is very possible that the widening of the face is accelerated at a much earlier age, but from the data this conclusion cannot be drawn. It must be further noted that the measurements of width increase as a result of bone deposition at both ends, so that the rate of cell activity at each end can be measured by one-half the rate of increase of the lateral measurement.

If we turn to the curves showing the growth changes in the upper alveolar arch and palate depths (Figs. 18 and 19), we shall note very interesting relationships. The *total palate depth* is measured from the anterior margin of the

anterior palatine fossa to a transverse line on the palate plate of the palate bone, indicating the nearest points of the posterior border. The *anterior palate depth of the maxilla* is the distance from the same anterior point to the transverse suture of the palatal processes of the maxilla and palate bones. The *posterior palate depth* is the width of the palate process of the palate bone. Unfortunately, the *alveolar arch depth* is measured from a different point in the anterior region, and for this reason the deductions made from these curves are again only approximate.

The *maxillary alveolar arch depth* is measured from the labial surfaces of the alveoli of the maxillary central incisors (prosthion superior) to a transverse line behind the last molars, which of course varies at the different stages. It happens, however, that the alveolar arch depth to a line behind the first permanent molars was measured for the different stages, so that from the

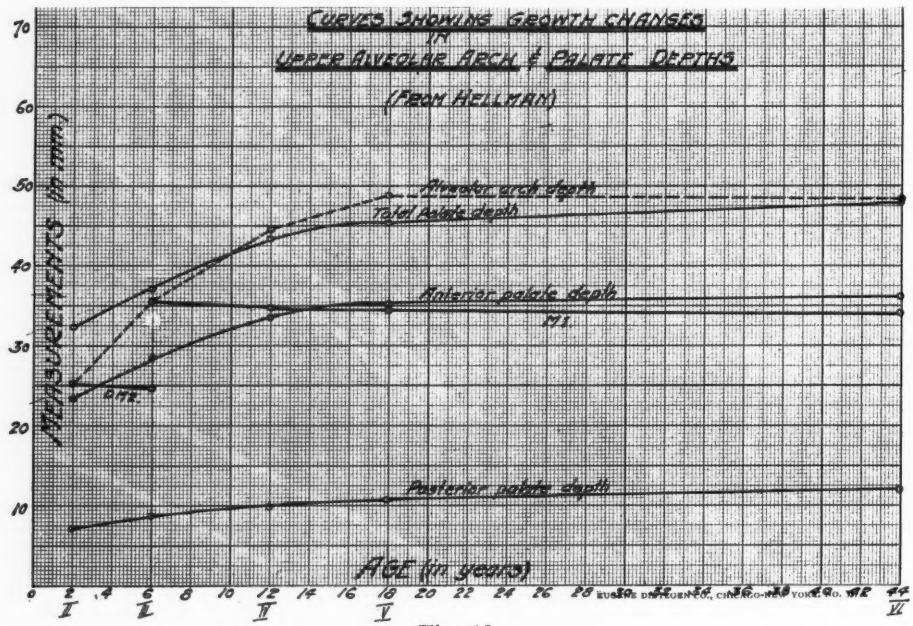

Fig. 18.

curve obtained by plotting these values, fairly reliable deductions can be made. It will be observed that the curve of the anterior palate depth crosses the curve of the alveolar arch depth at the first molar region (Fig. 18). This is important because it indicates that while the palate increases in length with age, the depth of the alveolar arch in the first molar region diminishes. We know from the studies of Brash that the posterior teeth move mesially through the bone during growth, so this condition is not surprising; but, since the anterior palate depth increases at a greater rate than that at which the alveolar arch depth diminishes in the first molar region, the question arises, How does the growth of the palate take place? Hellman arrived at the conclusion that the palate grows from before backward, and from his interpretations he disproves the contention that the face grows forward. In the continuation of our studies it makes a great deal of difference whether one or the other method of growth is taken as correct.

According to Hellman's conceptions, additions to depth are made at the posterior end of the structures involved, the palate and the alveolar processes of the maxilla. As a result of these additions the maxilla is pushed forward. If we further consider that Brash could not demonstrate excessive growth in the sutures, then we must question the correctness of Hellman's deductions. Up to the present time the sutures were considered as the sites of bone growth, but by the madder method it was definitely demonstrated that additions at the free edges and surface deposition and absorption are responsible for bone growth. The sutures play no part in it. The maxilla is not exempt from this general process, and indeed it was shown that the maxilla grows similarly by surface deposition and absorption and additions to the free alveolar edge.

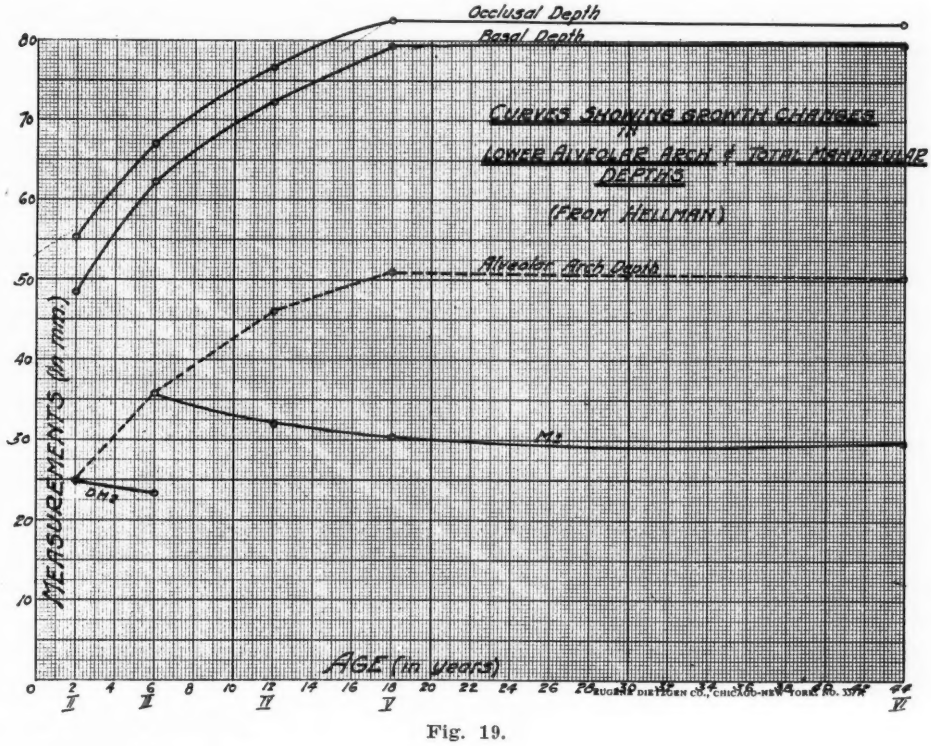

Fig. 19.

The increase in palate depth is also part of this process. During growth deposition or absorption occurs on every surface of the maxilla, and from the interpretation of these curves the deposits in the anterior region must be considerable.

Simultaneously with bone deposition, the teeth in the entire dental arch move forward through the bone and thus create more space for the erupting molars. The curves show this definitely. The curve for the anterior palate depth indicates that the palate portion of the maxillary bone increases in depth with age. It will be observed that at Stage II the alveolar arch depth is slightly longer than the anterior palate depth. It was pointed out, however, that the alveolar arch depth was measured from a more anterior point; so we may consider the distal surface of the second deciduous molar approximately on line with the transverse palatal suture. When Stage III is reached.

the alveolar arch depth becomes longer as a result of the eruption of the first permanent molar. At this stage the distal surface of the first permanent molar is situated about 7 mm. behind the transverse palatal suture, as indicated by the difference of the ordinates of the two curves at that stage. We find, however, that at Stage IV the distal surface of the first permanent molar is approximately on line with the transverse palatal suture. Now the question arises, What has happened?

The alveolar arch depth in the first permanent molar region becomes shorter at Stage IV but only by a comparatively small amount, and this can be accounted for by the difference in the mesiodistal diameters of the posterior teeth between the deciduous and the permanent sets. Furthermore, Brash has demonstrated that the first permanent molar moves mesially through the alveolar bone. It is possible to conceive that with these facts Hellman's explanation is correct, but other demonstrated facts must be taken into consideration.

First of all, the first permanent molar is not the only tooth which moves forward through the alveolar bone during growth. This was shown to be a general condition with all teeth, including the anterior teeth. There is a definite deposit of bone on the labial surface of the alveolar process supporting the anterior teeth; so the curve of the alveolar arch depth in the first molar region shows only the relative rate of forward movement between the first molar and the anterior teeth. The forward movement of the other teeth confirms the conclusion that the first molar moves forward at a much greater rate than the curve indicates. Second, it was pointed out that growth cannot be demonstrated in the sutures. These correlated facts point to an error in Hellman's explanation, and the curves confirm Brash's deductions that the jaws grow forward by surface depositions and absorptions. Thus the entire dental arch moves forward through the alveolar bone, and, when the first permanent molar erupts, it takes a position behind the second deciduous molar. As a result of the general forward tendency, by the time Stage IV is reached, the first permanent molar moves forward far enough to take the position originally occupied by the second deciduous molar, or in many instances a more forward position. There is comparatively little increase in the posterior palate depth during the entire span of life, but it is sufficient to accommodate the second and third permanent molars, which erupt at a later stage.

The mandibular arch depth shows similar changes (Fig. 19), but, since no other dimension is given, it is not permissible to draw very definite conclusions. It is clearly shown, however, that the mandibular alveolar arch depth in the same region decreases more than the maxillary alveolar arch depth during life. Furthermore, we know that bone is continually deposited on the labial surfaces of the mandibular alveoli, so that mandibular arch growth must take place in a manner similar to the maxillary arch growth. For this reason we may provisionally accept that the mandibular arch grows by the forward movement of all teeth through the bone and by surface deposition labially and buccally.

The *occlusal mandibular depth* is measured from the labial surface of the alveolar process of the central incisors to the posterior margin of the ramus in the same plane. The *basal depth,* on the other hand, is measured from the most prominent point on the chin to the gonion. These two curves are essentially parallel, and it does not make any difference which one is used for determining the anteroposterior rate of growth of the mandible.

Brash has further demonstrated that during growth there is a definite addition of bone at the posterior border of the ramus, so that these measurements increase at both ends as the enlargement of bone progresses. This is important, for the rate of growth determined from these curves would represent a combination of the rates of growth at two ends, which individually must be less than the value obtained from these curves. The additions to the posterior border of the ramus are, however, in excess of the labial deposits, and for this reason the labial deposits will be neglected. It must be recognized that in the cranium there are several structures included between the glenoid cavity and the maxillary incisors, and that the rate of growth between those two areas must be dependent upon the rates of growth of the several included structures. In the mandible this is not the case. Being a single bone spanning the distance between the two areas, the mandible must grow forward at the combined rates of the included cranial structures. Thus the mandible grows forward more rapidly than any one of the cranial bones in question, and as we shall see later, just for this reason, it is more likely to be affected by injurious agents during growth than any other bone of the face.

The rates of growth in the three dimensions of space were determined from this series of curves as described, and the figures in Table VI were obtained.

TABLE VI

THE RELATIVE RATES OF GROWTH AND THE PERIODS OF GREATEST GROWTH IN DIFFERENT DIRECTIONS

		MILLIMETERS PER YEAR	CORRECTED MM./YEAR	RELATIVE RATES OF GROWTH	PERIOD OF GREATEST GROWTH
Total face height		3.535	3.535		
Upper face height		2.069	2.069	8.0	6-12
Lower face height		0.932	0.932	4.0	6-12
Dental height		0.273	0.136	0.5	6-12
Maxillary alveolar arch width	Maximum	0.500	0.250	1.0	6-18
	First molar region				
	Minimum	0.727	0.364	1.5	2-12
Mandibular alveolar arch width	Maximum	−.090	−.045	0	6-12
	First molar region				
	Minimum	0.773	0.386	1.5	2-18
Anterior palate depth		0.943	0.943	4.0	2-12
Maxillary alveolar arch depth		−.136	−.136	−.5	6-18
Basal depth		1.679	1.679	6.7	2-18
Mandibular alveolar arch depth		−.625	−.625	−2.5	6-18

In the first column of figures we find the values obtained directly from the curves, but those values do not represent the rates of growth in millimeters per year as they occur at the various sites of growth. If, for instance, we consider the rate of growth of the upper face height in relation to that of the maximum alveolar arch width, we note that in the vertical direction the

former has only one site of growth, the alveolar edge; while in the case of the latter, growth occurs laterally at both ends of the distance measured. For this reason some of the rates given in the first column of the table had to be modified, and the second column gives the corrected rates at each site of growth. The recognition of these sites of growth is important, because growth is directly proportional to the amount of cell activity in any particular location. The greater the cell activity, the greater the growth, and primarily we are interested in the amount of cell activity responsible for bone growth. Thus, the second column gives the rate of bone growth and also the relative rates of cell activity.

The rate of cell activity may be expressed in terms of a standard, which in this investigation is the maximum alveolar arch width in the first molar region. Taking this as unity, the other rates in round numbers are given in the third column. It will be observed that the upper face height increases eight times as rapidly as the adopted standard, while the basal depth increases almost seven times as rapidly. These rates of growth play an important part in the development of malocclusions and jaw deformities; but, before entering into a discussion of the development of malformations, the feebleness of growth must be thoroughly studied.

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(To be continued)

A COMPARATIVE FUNCTIONAL STUDY OF THE MUSCLES OF MASTICATION IN HUMAN AND MONKEY

Demonstrated by Motion Pictures of Uninjected Dissections

Harry H. Shapiro,* New York, N. Y.

A REVIEW of the anatomy of the musculature of the face and jaws is of importance at the present time, because of the awakened interest in the use of these structures in orthodontic therapy.[1, 2, 3]

Because of the newer concept in the teaching of anatomy,[4] a dynamic rather than a static approach, it has seemed to me of advantage in visualizing the reality of these muscles to present them in function. About two years ago I presented a motion picture made from a dissection of the deep muscles of mastication in the human being, before the New York Society of Orthodontists.[5] I shall now present a film of a more recent dissection of these muscles and of the temporomandibular articulation in both human and monkey.

The dissections have been made through the facilities of the Department of Anatomy, College of Physicians and Surgeons, Columbia University, from uninjected specimens, so that the elasticity of the living muscle fibers might be approached as closely as possible.

In both human and monkey, the masseter, temporalis, and internal and external pterygoid muscles are demonstrated in the film during open and shut, protrusion, retraction, and lateral movements of the mandible (Fig. 1). It is of interest to note the extent of motion within the temporomandibular articulation during the functioning of the muscles, to observe the freedom and play of the head of the condyle and articular disk during function, and the manner in which the condyle hangs suspended from its fossa in the temporal bone; and to note the relative size of the head of the condyle from its medial to lateral aspect, as seen from the posterior view. This three dimensional visualization of the head of the condyle and the fossa with which it articulates is a fundamental concept which should be clearly felt when referring to any functionings within the temporomandibular articulation.

In the demonstration on the monkey an interesting experiment, suggested by Dr. W. M. Rogers of the Department of Anatomy, was attempted by the use of electrode application to the muscles after they were dissected. The material was fresh and uninjected. The dissection had been completed about

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two hours after death, and it was felt that the response to electrode stimulation might demonstrate contraction of the muscle fibers of their own accord.

The jaws were opened and a piece of corrugated cardboard was inserted between the teeth. The electrodes were brought into contact with the fibers

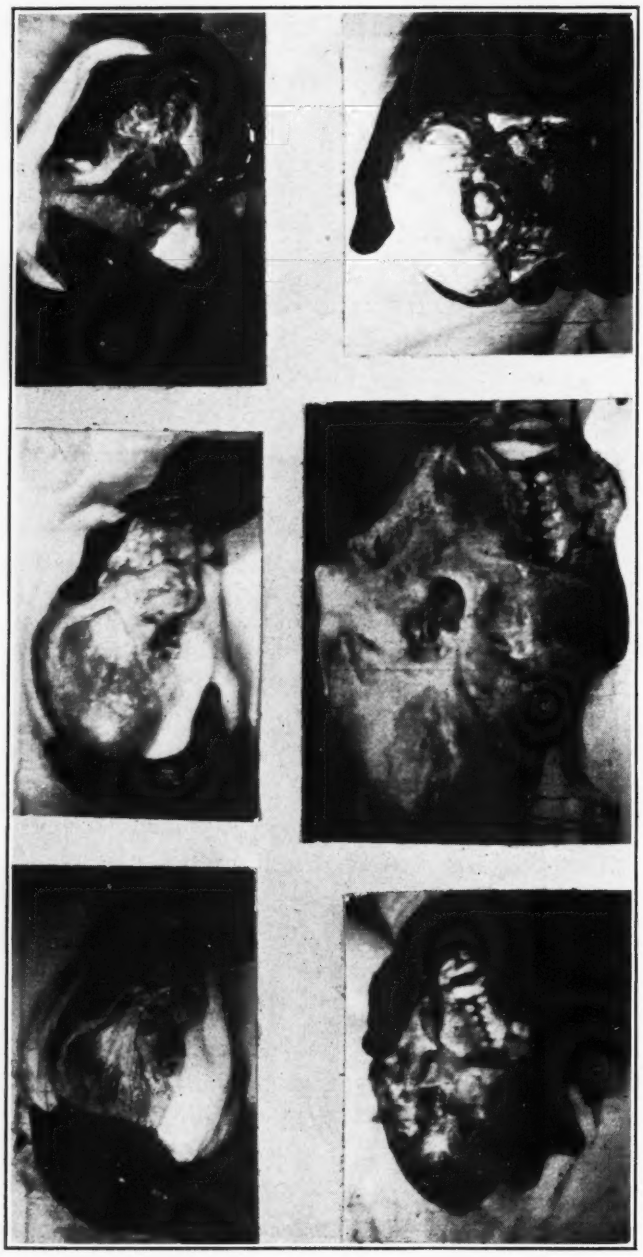

Fig. 1.—*A*, Temporalis; *B*, masseter; *C*, pterygoids.

of the masseter, and the jaws closed slowly in response, bending the cardboard (Fig. 2*A*). The jaws were reopened, a similar piece of cardboard was inserted between them, and the fibers of temporalis were stimulated. The response was immediate and powerful, the jaws closed with a snap and the cardboard was crushed between them (Fig. 2*C*). In a future dissection it is

my intention to place a pressure gauge between the jaws so that the exact poundage may be registered. The demonstration, however, seems sufficiently convincing to establish the relative strengths of temporalis and masseter during the closing function.

Fig. 2.—*A*, Masseter stimulated by electrodes; *B*, dissection of joint; *C*, temporalis stimulated by electrodes.

In order to orient the film which follows, I shall show a number of slides of the muscles of mastication, after Spalteholtz,[6] and a few demonstrating various aspects of the anatomy of the temporomandibular articulation, made from photographs of a very careful dissection of the region (Fig. 2*B*), (courtesy of the Department of Anatomy, College of Physicians and Surgeons, Columbia University) indicating the relation of condyle and temporal fossa, the articular capsule, articular disk, synovial cavities and ligaments,

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A LATERALLY DISPLACED MANDIBLE: TREATMENT SIMPLIFIED BY THE AID OF A SPLINT

EARL F. LUSSIER, D.D.S., SAN FRANCISCO, CALIF.

THE object of this report is twofold: First, it is suggested as a method of case reporting proposed for consideration by this society to be adopted as a universal method for all future case reports. Second, the report itself was selected because of the simplicity of treatment of laterally displaced mandibles.

The history of case reports reveals to us that very often the contributions were in the nature of addresses and, therefore, were of very little value as records of original investigations. Their various methods of presentation made it difficult to make comparative studies, and the lack of a uniform method of accumulating facts made it impossible to index various groups of facts, and because of this a vast amount of valuable material has been lost forever.

The subject matter of early reports contained poor photographs of crude sets of plaster models of the teeth in occlusion together with meager data in regard to the history and treatment of the case, written in no particular outline or form.

Later the reports contained additional data in the form of facial studies, such as plaster casts and poorly posed photographs of the face.

Finally attempts were made to present more accurate denture and facial reproductions together with radiographic data. In no instance has there been an effort to make reports in a manner that could result in an accurate comparison of additional data of the same case or comparison of similar cases, and up to the present all methods fail completely in presenting ways of accurately compiling the data in the form of helpful indexes.

The time has arrived to substitute for our unscientific attitude and meager data a carefully planned method of laboratory investigation and the compilation of accurate, unbiased, comprehensive clinical records of standardized form.

One need only study the records of any specialty of medicine to be convinced of the need of some universal scientific method of case reporting. The consideration of medical reports reveals that a very definite method is followed. The report contains the history of the patient, weight, height, clinical observation, blood pressure, blood analysis, urinalysis, basal metabolism, clinical photographs and radiographs of the subject, the diagnosis, treatment, results, and observations. The advantages in such a procedure are many. Immediately we are impressed with the fact that we are all talking the same language, so to speak, and we understand fully what the essayist means. Additional data on a case are merely reading another chapter. Similar cases are easily detected, and material on any case is readily indexed and filed.

Presented to the American Board of Orthodontia, and released by the Board to be presented at the Thirty-Third Annual Meeting of the American Society of Orthodontists, New York, N. Y., April 30, May 1, 2, and 3, 1935.

The methods to be adopted should have the minimum-maximum data. The outline to follow has already been proposed by a committee headed by Dr. James McCoy and has been adopted and is used in reporting cases to the American Board of Orthodontia.

This outline for the writing of histories of treated cases to be presented to the American Board of Orthodontia is as follows:

1. Title.
2. History.
3. Attributed Etiology.
4. Diagnosis.
5. Treatment Therapy Employed.
6. Results Achieved.
7. Prognosis.
8. Observation and Conclusion.

In presenting this case report, I shall endeavor to present an accurate and scientific method for universal adoption following the above outline.

Title.—A Laterally Displaced Mandible: Treatment Simplified by the Aid of a Splint.

History.—The patient, a girl (Fig. 1) twelve years of age, presented a laterally displaced mandible; the left lateral half of the maxillary arch was underdeveloped. The facial deformity involved the development of the chin, which was noticeably deflected to the left and was lacking in normal prominence. The lower third facial height was short. There was no evidence of this particular type of malocclusion on either side of the family. She had had no prolonged or serious illness. She had had whooping cough. Tonsils and adenoids had been removed. Her height was sixty-three inches and weight ninety-seven and one-fourth pounds. Her health was good, nutrition fair. She was of a nervous temperament.

Attributed Etiology.—The only etiologic factor that was disclosed was the habit of biting the nails.

Diagnosis.—Photostatic facial reproductions, gnathostatic plaster denture reproductions, and radiographic examinations were made (Fig. 2). Graphs of the gnathostatic plaster denture reproduction were made (Fig. 3). An appraisal of the material showed that the anomaly in relation to the:

A. *Raphe median plane* (relation of the lateral halves of the denture to the median plane) to involve in the maxillary arch a total dental alveolar contraction medium and asymmetrical and to involve in the mandibular arch an incisal dental alveolar contraction mild and asymmetrical. The figures comparing the width between the molars and the premolars to pons normal are:

Distance between $\underline{4\,|}$ and $\underline{|\,4}$	– 9.15	mm.
Distance between $\underline{6\,|}$ and $\underline{|\,6}$	– 4.87	mm.
Distance between $\overline{6\,|}$ and $\overline{|\,6}$	+ 1.13	mm.
Distance between $\overline{4\,|}$ and $\overline{|\,4}$	– 2	mm.

Fig. 1.

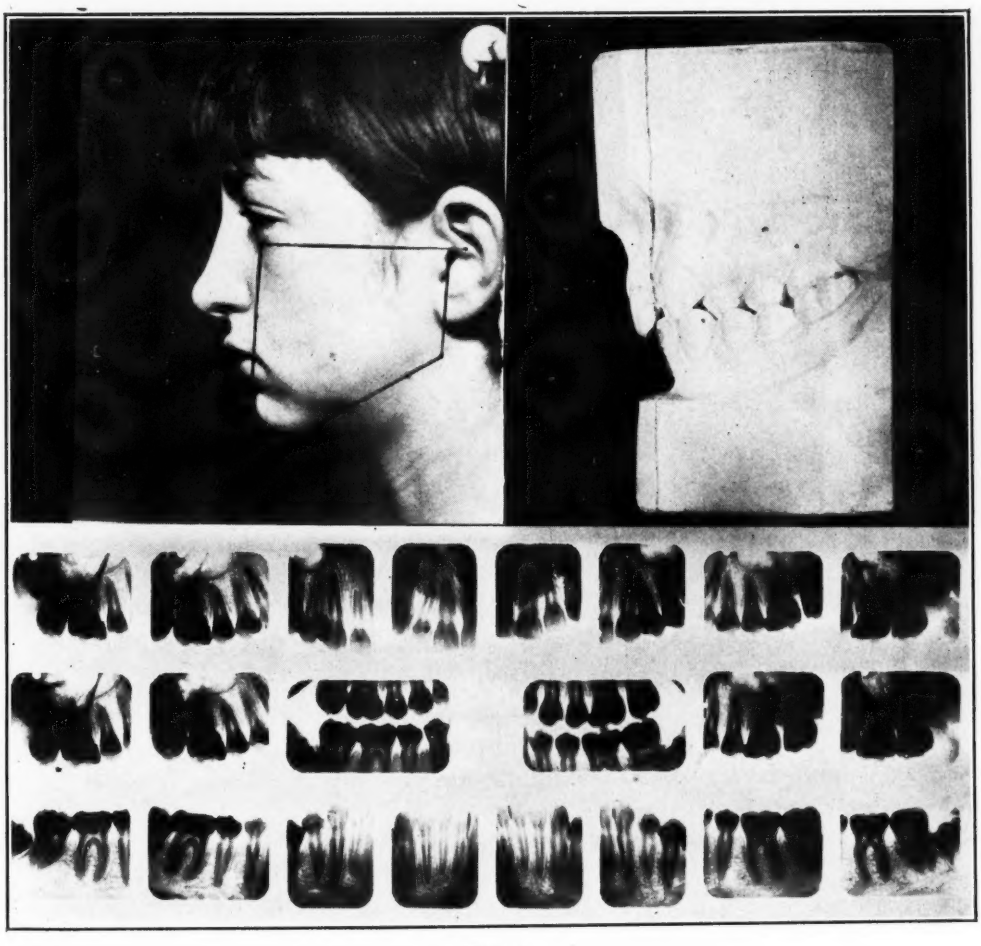

Fig. 2.

B. *Orbital plane.* Both the photostatic profile facial reproduction and the denture reproduction showed a marked change from the normal. They reveal in the maxillary arch an incisal dental alveolar retraction asymmetrical and a total mandibular retraction medium (one-half tooth) and asymmetrical. The photostatic facial reproduction disclosed a loss of facial height.

C. *Eye-ear plane.* To involve in the maxillary arch a total dental attraction and in the mandibular arch a total mandibular attraction, due to the laterally displaced mandible.

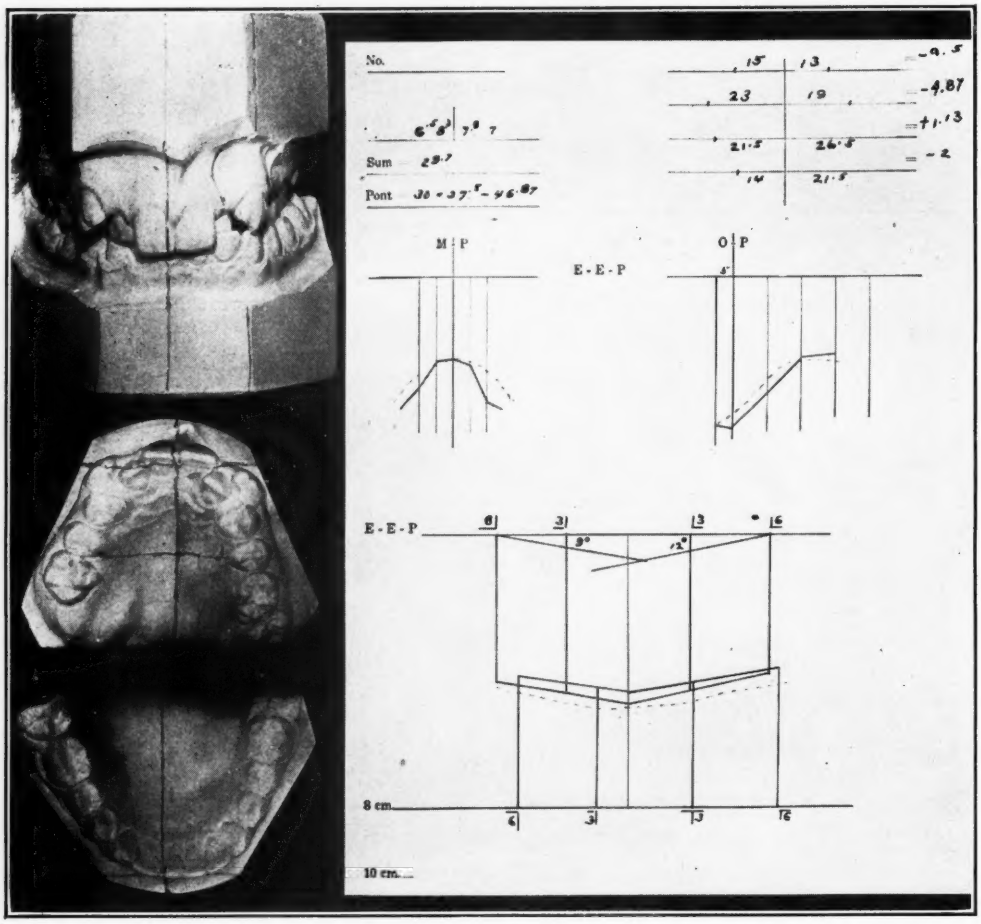

Fig. 3.

Treatment Therapy Employed.—The treatment of the case was divided into two parts (Fig. 4). First part of treatment: The study of the face and casts when the mandible was moved into the normal median plane revealed that a slight widening of the maxillary premolars and molars would enable the mandible to rest in this favorable position. It was decided to make a splint on the mandibular teeth to hold the teeth in occlusion in this position while treatment was instituted in the maxillary arch.

No. I, *mandibular splint.*—The patient was instructed to bite into a wax mold in this normal centric position after which the wax was placed on a model

of the mandibular teeth and the waxing was finished, accentuating the occlusal markings. From this wax pattern a vulcanite splint was made.

No. I, *maxillary appliance.*—Anchor bands 0.007 inch in thickness and 0.018 inch in width were fitted to the maxillary first permanent molars. Half round tubes were soldered to the lingual surfaces of the molar bands. At this

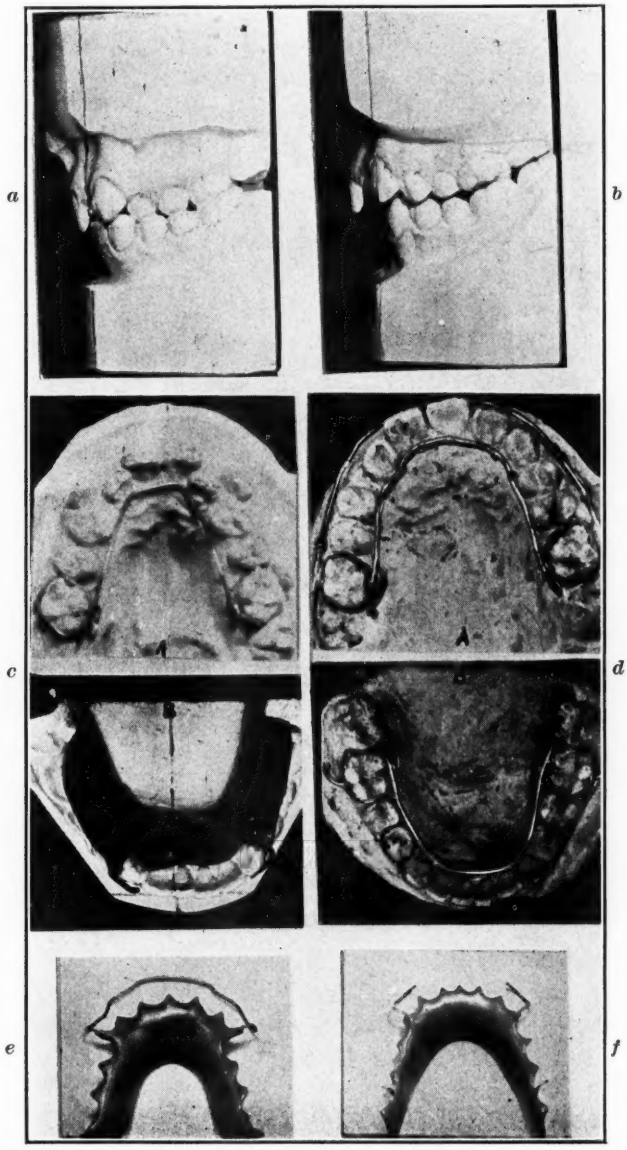

Fig. 4.—*a*, Model at beginning of treatment No. I; *b*, model at beginning of treatment No. II; *c*, maxillary appliance and mandibular splint used in treatment No. I; *d*, maxillary and mandibular appliance used in treatment No. II; *e*, maxillary retainer; *f*, mandibular retainer.

point an impression was taken with the bands in position, and an artificial stone model was poured. A lingual wire 0.040 inch in diameter was then closely adapted to the lingual surfaces of the teeth on the cast; and after half round posts were soldered, it was adjusted in position by the heat treatment method; 0.022 inch lock springs were soldered to the body wire. Stabilizers of 0.025 inch

wire were soldered on either side of the mesial of the first premolars to hold the auxiliary springs in their place. Auxiliary springs of the compound, recurved spring type were soldered at the distal of the second premolars to engage the premolars, canines, and lateral incisors. Round tubes 0.040 inch were soldered to the buccal surfaces of the molar bands. The maxillary bands were cemented in place and the arches adjusted in position. The patient was instructed to wear the splint.

The necessary width in the posterior and anterior region was easily and quickly obtained in three months. The splint was then removed, and the maxillary teeth engaged the mandibular teeth in the expected manner and position.

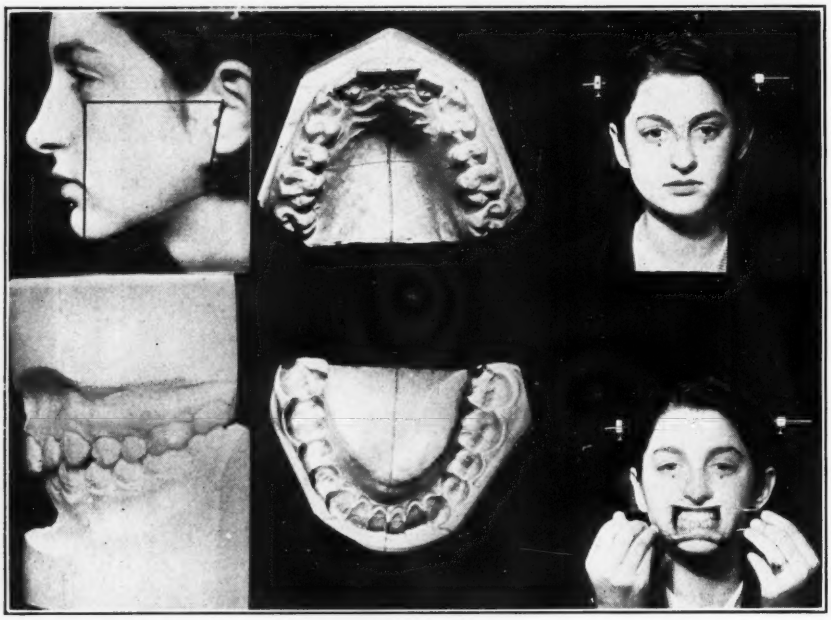

Fig. 5.

The second part of the treatment: There was an uncontrolled lapse of a year between the first part of active treatment and the second part of treatment; during this time the patient was advised to perform a biting exercise. At the beginning of the second part of treatment a maxillary labial and lingual appliance and a mandibular lingual appliance were placed. Intermaxillary elastics were used.

No. II, *maxillary appliance.*—The anchor bands used in the first part of treatment were refitted to the maxillary first permanent molars. At this point an impression was taken with the bands in position, and an artificial stone model was poured. A new lingual arch was made. An 0.040 inch labial body wire was adapted to the case; 0.022 inch wire stop springs were soldered on either side. Intermaxillary hooks of 0.030 inch round wire were soldered at the region of the canines.

No. II, *mandibular appliance.*—Anchor bands, 0.007 inch in thickness and 0.018 inch in width, were fitted to the first permanent molars. Half round tubes

were soldered to the lingual surfaces of the anchor bands. At this point an impression was taken with the molar bands in position, and an artificial stone model was poured. A lingual wire 0.040 inch in diameter was then closely adapted to the lingual surfaces of the teeth of the cast; and after half round posts were soldered, it was adjusted in place by the heat treatment method; 0.022 inch wire lock springs were soldered to the body wire. Intermaxillary hooks of 0.030 inch round wire were soldered to the buccal surface of the molar bands.

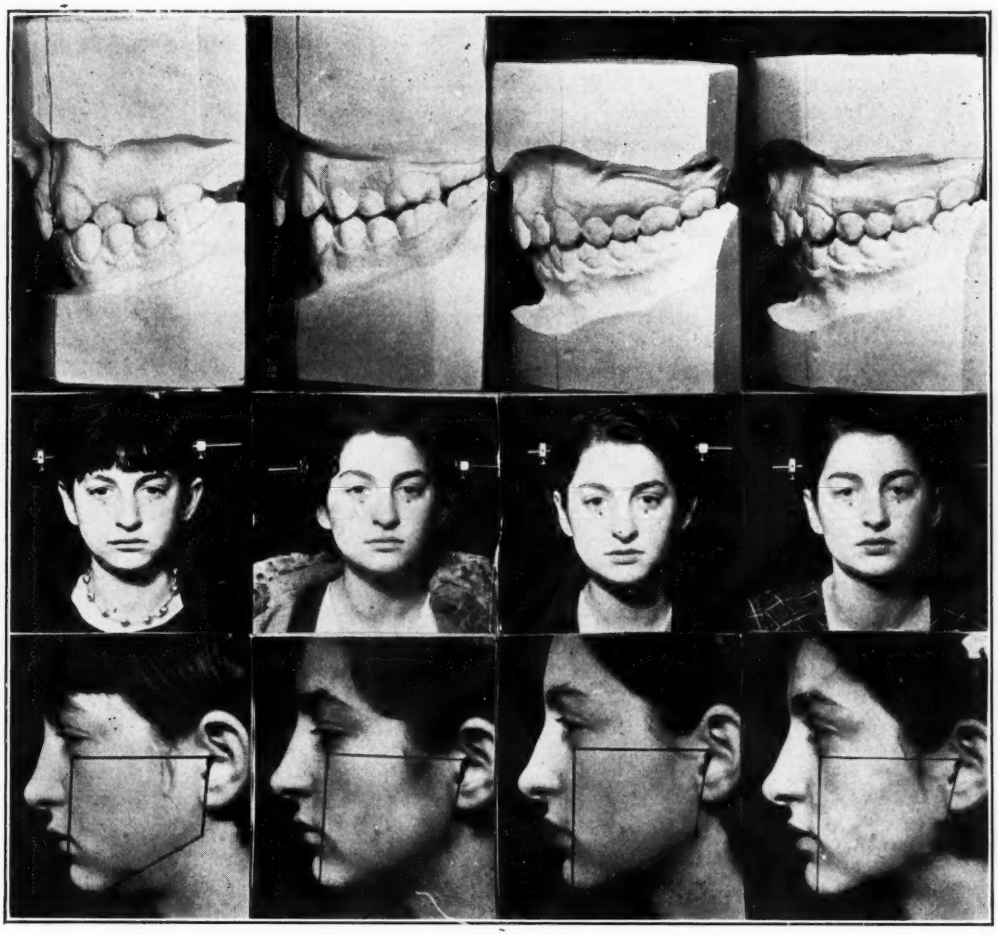

Fig. 6.

The mandibular bands were cemented in place, and the arch was adjusted in position. These were worn in this dormant condition for a week. The arches were then removed, and an adjustment was made. Intermaxillary elastics were started to be used.

Results Achieved.—The examination was made on March 14, 1931. The mandibular splint was placed on March 16, and constitutes the first part of the treatment. The splint was discontinued August 27. A year later the case was continued. The mandibular lingual appliance was placed, and the patient was observed regularly for a year. The total treatment time lasted sixteen months. At the end of that time all the appliances were removed. Gnathostatic

plaster denture reproductions, photostatic facial reproductions, and radiographic examination was made. The change in occlusion and facial change was noticeable (Fig. 5).

In January, 1935, one year and a half after treatment and a year after the patient neglectfully discarded the retainers, plaster denture reproductions and photostatic facial reproductions and radiographic examinations were made. A further change in facial development was discernible.

Prognosis.—Prognosis in this case is for a favorable result.

Observation and Conclusion.—The final data show a further change in facial development. But for a slight change of two teeth, no collapse of the case has occurred. The use of the splint shortened greatly the length of the treatment period. The normal functional position of the teeth added greatly in a normal facial change. An interesting and valuable observation is the comparison of plaster dentures and photostatic facial reproductions, before treatment, at time of discarding of splint, at the end of active treatment, and a year after retainers were discarded. Additional similar data may be obtained in the future if conditions permit, and because of the accurate, scientific, uniform method of accumulating data these added chapters on the case make for progress in our knowledge (Fig. 6).

SIMPLICITY OF APPLIANCE USED IN CONJUNCTION WITH MYOFUNCTIONAL THERAPY FOR THE TREATMENT OF DISTOCLUSION COMPLICATED BY MOUTH-BREATHING*

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HISTORY.—The patient was a boy twelve years of age, four feet eleven inches tall, weighing eighty-nine pounds. General health was good. The child was breast fed for three months; then rickets developed necessitating a change to the bottle which was continued for six months; had measles at one year, and rheumatic fever at two years and four months. Tonsils and adenoids were removed at two and one-half years, but mouth-breathing still persisted. Thumb-sucking was indulged in until five years of age.

Diagnosis.—This boy showed a tendency to distoversion; a maxillary left deciduous canine was present which presented an interference. The mandibular incisors were in linguoversion, and the maxillary incisors were in labioversion.

Treatment.—The maxillary left deciduous canine was extracted; then maxillary and mandibular molar bands and lingual wires were applied to obtain lateral development, with finger springs to the mandibular incisors to bring these teeth into their normal positions. After two months of treatment a high labial wire was applied to bring the maxillary incisors into their normal positions. This high labial wire was discontinued after six months, and the patient was given exercises to stimulate normal tone and function in the orbicularis oris and related muscles.

The appliances used in the exercise to correct the faulty lip habit consisted of two celluloid cards, the smaller one measuring two inches in length by 5/8 in. in width and 0.022 inch thick. When instructing a patient in this exercise, it is suggested that the card be used as a bookmark, and that when the book is in use, the card be placed between the lips and held passively in that position. This simple act teaches the lips to remain together; if they separate, the card will fall and must be replaced.

The larger card measures three inches in length, one and three-quarters inches wide at one end and narrows to one-half inch at the other end. This card is utilized in an exercise to develop the orbicularis oris muscle, as I shall explain.

In the majority of mouth-breathers it is found that the lips are greatly lacking in muscular tone—that a state of hypotonicity of the muscles exists—and we must make these patients lip conscious. Occasionally a patient has a habit of curling the lips away from the teeth, especially the upper lip, during the act of speaking or smiling.

*Presented to the American Board of Orthodontia, and released by the Board to be given at the Thirty-Third Annual Meeting of the American Society of Orthodontists, New York, N. Y., April 30, May 1, 2, and 3, 1935.

Fig. 1.

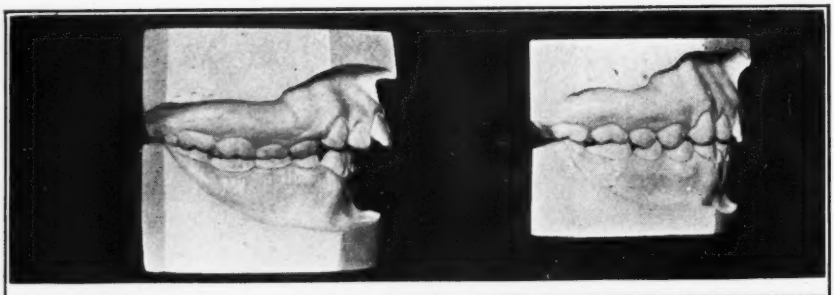

Fig. 2.

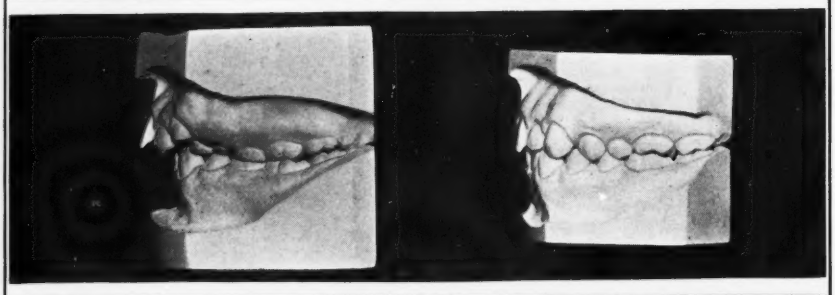

Fig. 3.

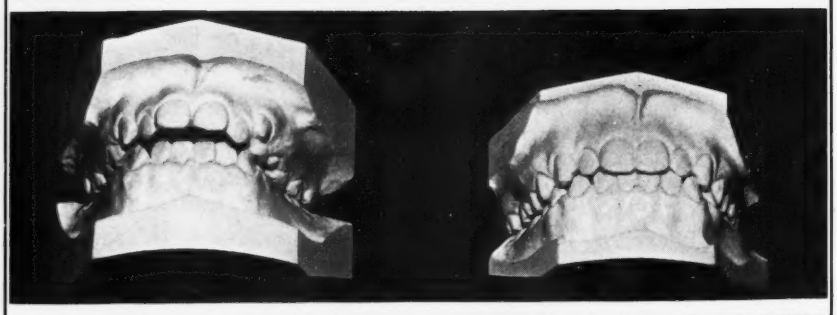

Fig. 4.

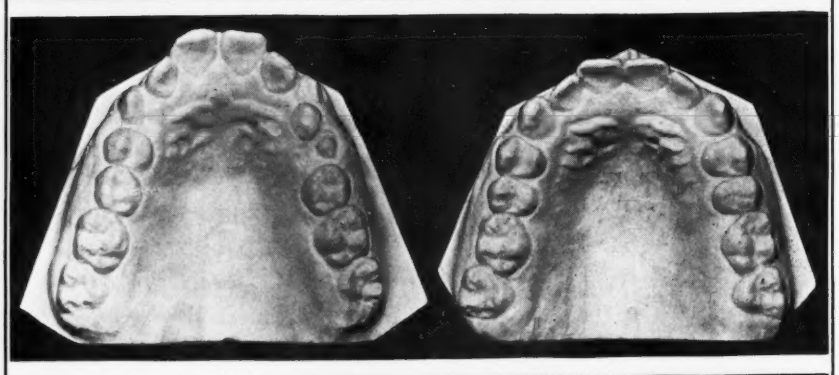

Fig. 5.

(See opposite page for legends.)

When the smaller end of this larger card is placed between the lips, it is often found that the patient has difficulty in retaining the card in a horizontal position and that the card sags considerably. The patient is taught to contract and relax rhythmically the orbicularis oris muscle which causes the card to assume a horizontal position at each contraction and then to sag again at each relaxation. It is important to have the molar teeth held in occlusion while this exercise is being performed, as there is a tendency on the part of many patients to thrust the mandible forward to aid in raising the card—this tendency should be discouraged.

It is essential to remember in the treatment of distoversion cases that maxillary interferences must be removed before the application of the masseter-temporal exercise.

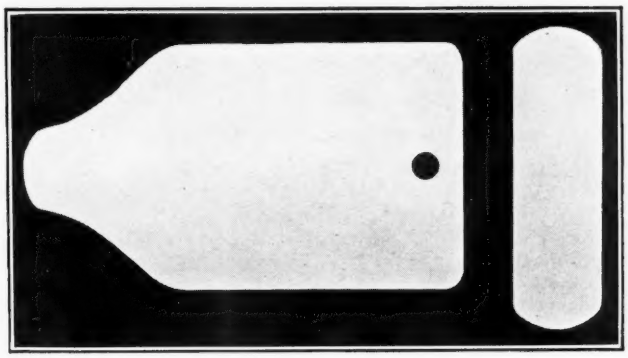

Fig 6.—Cards used for orbicularis oris exercise.

After the interferences were removed, the patient was taught the correct mesiodistal relation of the mandible to the maxilla and given the masseter-temporal exercise to develop this group of muscles and thus obtain normal muscular tone and balance. No elastics were used in the treatment.

The active treatment was accomplished in fourteen months; then the maxillary appliance was removed. The exercises were continued, and during this time the condition improved from the better interdigitation of individual teeth. The remainder of the appliances were removed at two years and one month from the date of starting treatment.

The patient, a boy of superior intelligence, gave splendid cooperation, which is very essential when increased muscular function is to be obtained through myofunctional therapy.

Fig. 1.—Right side before and after treatment.
Fig. 2.—Left side before and after treatment.
Fig. 3.—Front view before and after treatment.
Fig. 4.—Occlusal view of maxillary arch before and after treatment.
Fig. 5.—Photograph of patient after treatment. (We regret that negative of original photograph has been misplaced.)

CASE REPORTS

S. Stuart Crouch, D.D.S., Toronto, Canada

SINCE the literature contains comparatively few reports showing conditions several years after treatment, the fact that these two reports do so may be sufficient reason for their presentation.

A famous surgeon has said that before every operation he reviews the anatomy of the parts, even though he has performed similar operations hundreds of times. Orthodontists might well learn from this to review carefully the fundamental principles upon which treatment of all cases of malocclusion should be based before commencing treatment. May I, therefore, preface my reports by recalling to your minds some of these fundamentals of treatment.

1. The objective of treatment has been well defined by A. F. Jackson[1] of Philadelphia as "The best arrangement of the teeth and jaw relations within the structural, functional, and esthetic limitations which will produce the most satisfactory ensemble, that will remain in a permanent state of balance after treatment has been completed."

2. The relationship of the jaws as a whole must be considered, and allowances made for complementary and compensatory movements.

3. Anatomic, physiologic, and habit interferences of all kinds must be removed, and the jaws placed in a position of mechanical advantage. (Rogers.[2])

4. The method of treatment should be predetermined, using the minimum of mechanical interference. A logical sequence should be planned, remembering, however, that changes of method and even of objective may have to be made because of unknown factors.

5. The method of treatment may be influenced by the amount of cooperation of which the patient is capable, especially as regards muscular development, habits, and economic restrictions. The method of treatment may be influenced also by the amount of tooth substance compared to the amount of bony tissue present, or which may be developed, and also, again, by hereditary influences.

6. The final result is determined by the aforementioned structural and functional limitations of the individual patient and by the ability of the operator.

SEVEN YEARS AFTER TREATMENT

The first report is on W. R. T., a young man twenty-seven years of age, for whom treatment was commenced in March, 1928. Fig. 1 shows, on the left, an occlusal view of the casts made at that time. The condition was diagnosed as a mutilated neutroclusion, the maxillary left first molar having been extracted five years previously.

Presented to the American Board of Orthodontia, and released by the Board to be given at the Thirty-Third Annual Meeting of the American Society of Orthodontists, New York, N. Y., April 30, May 1, 2, and 3, 1935.

There was a marked labial inclination of the maxillary anterior teeth, as shown by the buccal views; the central incisors were separated by an abnormally large frenum labium, with low attachment. The maxillary left premolars were

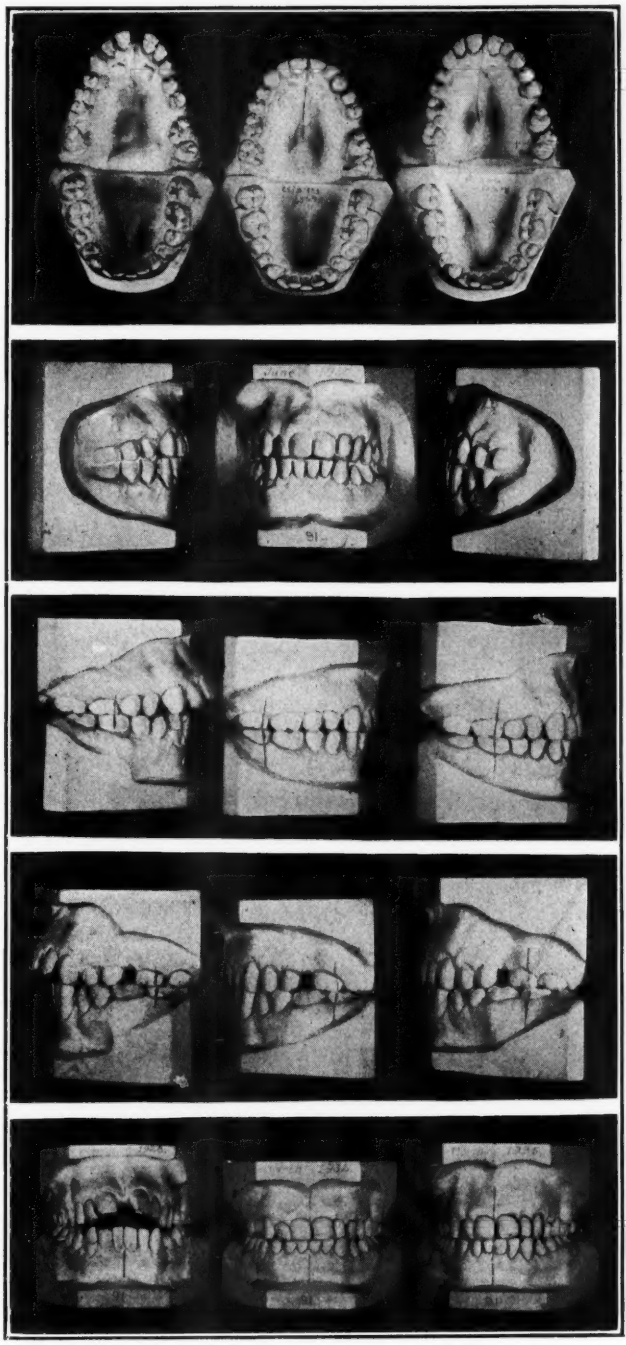

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

in linguoversion, and the mandibular left second premolar was in buccoversion. The upper lip was extremely short and thick and lacking in muscular tone. The patient had been a mouth-breather for many years.

Because of age and financial limitations, treatment was confined to the maxillary arch, and no attempt was made to close the space left by the extraction of the maxillary left first molar.

Before treatment was commenced, the patient was impressed with the necessity for his full cooperation in endeavoring to develop normal lip pressure and to overcome mouth-breathing.

Treatment.—As the method of treatment followed was the simple application of force with which every orthodontist is familiar, whatever type of appliances may be used, time will not be spent in relating the details of treatment.

Bands were fitted to the maxillary second premolars, right first molar, and left second molar; and maxillary lingual and high labial wires, with auxiliary springs, were inserted.

The lingual arch wire was removed eight months after insertion, and the labial arch wire twelve months after commencement of treatment.

A maxillary Hawley type retainer was then inserted and worn continuously for three months. It was then inserted two or three nights a week for twenty-one months, when it was discarded.

Exercises were prescribed with a view to improving the muscular tone, and particularly for lengthening the upper lip. This upper lip development was essential if the maxillary anterior teeth were to be held in position after the Hawley retainer was left off. The patient cooperated faithfully in these exercises, and the proportion of success attained was largely due to his efforts.

This patient was seen forty-two times, for a total of nineteen chair hours.

The first casts were made in March, 1928. A cast from a labial impression was made in June, 1930. The third casts were made in February, 1932, fifteen months after the Hawley retainer was left off; and the fourth casts two years later, in March, 1935.

Fig. 1 shows, from left to right, occlusal views of the casts made in March, 1928, in February, 1932, and in March, 1935. Fig. 2 shows views of the cast made from a labial impression in June, 1930, while the Hawley retainer was being worn two or three nights a week. Fig. 3 shows, from left to right, right side views; Fig. 4 left side views; and Fig. 5 front views of the casts made in March, 1928, in February, 1932, and in March, 1935, respectively.

It may be concluded that normal lip function may be attained long after the developmental period has passed, and that compromise treatment may be considered justifiable in this case because of: (a) the mutilation, consisting of the loss of the maxillary left first molar; (b) the age of the patient, twenty-seven years; and (c) the economic limitations.

RESULT OF TREATMENT AFTER EXTRACTION OF FOUR PREMOLARS

Case 2 is of a patient, C. H., a seventeen-year-old girl who presented for treatment in March, 1928.

The malocclusion was diagnosed as a neutroclusion; there was a marked crowding of the anterior teeth, a very small apical base, and an open-bite. (Fig. 6.)

The patient's general health was excellent, and the tissues of the mouth were healthy except for a slight gingivitis about the overlapping teeth.

Because of the age of the patient, the smallness of her facial features, the open-bite, and the improbability of being able to stimulate sufficient bone development to accommodate and maintain the teeth in proper alignment, it was decided to extract the four first premolars.

Anchor bands were fitted to the four first molars. Maxillary and mandibular lingual wires and a maxillary high labial wire, with auxiliary springs, were

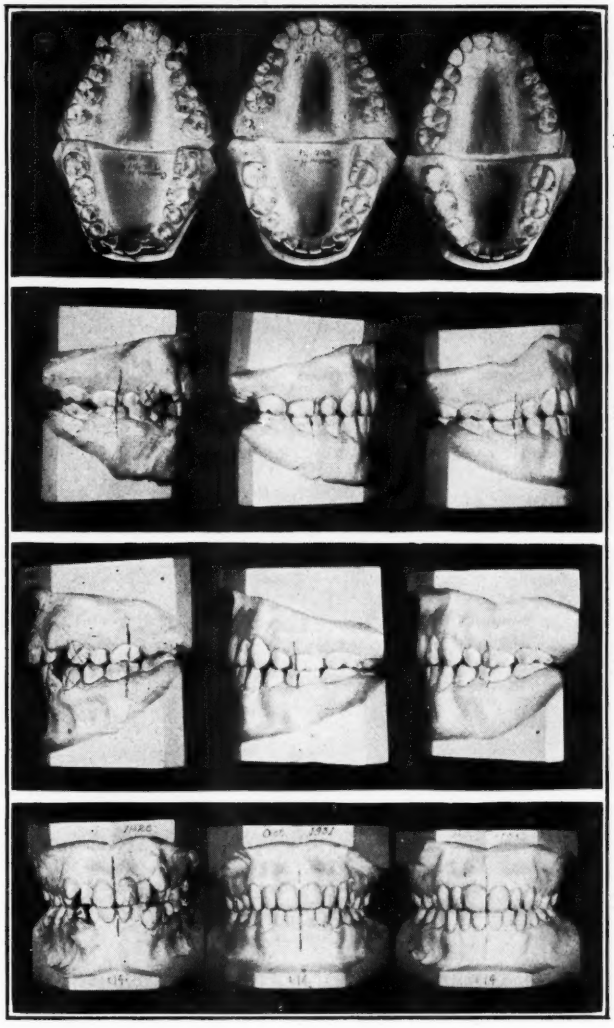

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

inserted. Bands were also fitted to the four canines, and vertical intermaxillary elastics in the canine region were worn for six months.

After twenty-four months, all appliances were removed, and a maxillary Hawley type retaining plate was inserted. This was worn continuously for four months and then at night only for six months.

The first casts were made at commencement of treatment in May, 1928. The second casts were made in October, 1931, six months after the retainer was left off. The third casts were made in March, 1935, seven years after treatment was commenced.

It may be of interest to note that the patient was seen fifty-six times, for a total of twenty-six hours in the chair.

Fig. 6 shows, from left to right, the occlusal views of the casts made in May, 1928, in October, 1931, and in March, 1935, respectively. Fig. 7 shows, from left to right, right side views, and Fig. 8 left side views, while Fig. 9 shows anterior views at the same dates.

May I conclude that the extraction of premolars was justifiable in this case: (1) because the patient was past the period of development; (2) because of the open-bite; and (3) because there was too great an amount of tooth substance compared to the amount of bone tissue present, or which I thought could be developed.

Although these cases show nothing new, striking, or original in the way of treatment, this presentation may suggest that we endeavor to do something for patients presenting with such great obstacles in the way of treatment as age, mutilation, lack of normal function and muscular tone, and financial restrictions; and that such may be accomplished in comparatively few chair hours of treatment, with the patient's earnest cooperation.

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A PROPOSAL FOR THE SOLUTION OF THE PROBLEM OF SO-CALLED "SOCIALIZED DENTAL SERVICE"

LANDIS H. WIRT, D.D.S., SOUTH BEND, IND.

A GREAT deal of ink has been spilled and much discussion has been heard about the supposed 80 per cent of the population who never receive dental service. Some hold that they cannot afford it, some that they could have it if they really wanted it, and others say that it is a matter of minor importance.

Foundations for the promotion of human welfare have been multiplying and extending their activities in every direction, stressing the idea that we are our brother's keeper, until many people who have always been willing to earn their living by honest labor are asking themselves whether it is not better to sit at home and let the welfare organizations take care of them. The next logical step in their process of warped thinking is to demand the living which they consider the world owes them as their right. They have cast into the discard the old adage that "Heaven helps those who help themselves," they have twisted out of all semblance to its original intent the concept set forth in the Declaration of Independence that "All men are created equal."

Every proposal which has thus far come to my attention has had at least some of its roots in the brains of social reformers, paid employes of foundations, brain trusters or their appendages, and in some instances it would not seem difficult actually to dig up sources among the followers of the Russian idea. All have by one means or another sought to replace stolen horses, without so much as a gesture toward putting a good lock on the stable door. The more or less concerted official action of the American Dental Association appears to be based principally upon the fear that we are going to be forced to accept some kind of insurance dentistry, like it or not, in which some of us will be obliged to hire ourselves out to work under the supervision of some more or less abstract political lay management, while the rest of us will find it difficult to attract sufficient clientele to make both ends meet.

Dentistry may be likened to Siamese twins, who are inseparably joined together but have different interests. One or the other is usually dominant and makes the decisions, while the other must docilely follow. The name of one is Professionalism; the other's name is Business. Professionalism's whole purpose in life is service. This service consists in relief of pain, elimination of disease, restoring lost function, and, in its highest type, in prevention of pain, disease and loss of function.

On the other hand, Business's life is devoted to paying the bills and laying by a competence for the proverbial rainy day.

The publisher regrets that this article did not appear with and preceding Dr. Wirt's article, "A Plan for Providing a Public Dental Health Service for All Children From Two to Fifteen Years of Age," in the January issue of the JOURNAL.

If dentistry is to remain a profession, we must be careful to insist that Professionalism be the dominant twin and make the decisions. We must make sure that the idea of service is kept in the foreground.

None of these schemes appears to be capable of real solution of the chief problem of dentistry, because they have their main application in relief of present temporary distress among both the dentists and the public, and not in the real purpose upon which the dental profession should rest, which is conservation of dental health.

It is always profitable when attempting the solution of any problem to examine what has been done in solving similar ones, taking care to maintain an open mind and freedom from fear of what is new just because it is new.

Let us leave to those who are immediately concerned the solution of problems of temporary relief of economic distress, if they can, while we address ourselves to the task of finding a means of rendering the highest possible type of service to the largest possible fraction of the public.

Let us look for a moment at the origin and growth of one of our most cherished institutions—the public school.

In the early days of our country the only schools were proprietary institutions, to which the sons of the well-to-do were sent for their education. Daughters were usually not supposed to need education.

Thomas Jefferson was one of the first outstanding proponents of public education in early times in the United States. In a letter to Washington in 1780 he said: "It is an axiom in my mind that our liberty can never be safe but in the hands of the people themselves, and that too, of the people with a certain degree of instruction. This, it is the business of the State to effect, and on a general plan."

James Madison was, next to Jefferson, the most active of the earlier statesmen in educational work. He said, "A popular government without popular information, or the means of getting it, is but a prologue to a farce, or a tragedy, or perhaps both."

The American people are convinced beyond question that their public school system has justified the argument of Daniel Webster made in 1821: "For the purpose of public instruction we hold every man subject to taxation in proportion to his property; and we look not to the question whether he himself have or have not children to be benefited by the education for which he pays. Tax supported schools are not charity schools. They are established in the interest of the whole people; and because of the controlling conviction that they are essential to the perpetuity of democratic institutions. The schools are therefore a proper charge upon all tax-paying persons and property, and not merely upon those whose children receive instruction therein."

Somewhat later, another of the world's straightest thinkers, Disraeli, said, "Public health is the foundation stone upon which rests the strength of a nation and the happiness of all people."

Thus, we find that there is a parallel in the minds of thinking men between education and health.

In the growth of the public school idea, there was encountered much opposition from the proprietors of private schools, who advanced much the same arguments as are heard today in opposition to efforts directed toward improvements in our health system or lack of it. The public school would take away their livelihood and nullify their investments. And among taxpayers objection was made by those who had no children to helping to pay for schooling the children of Tom, Dick, and Harry. But in the end, the wiser counsels prevailed and the public schools were established. First elementary schools, then high school and university work were added, and later in practically every state education was made compulsory. Result? Our most cherished and popular institution, in which we have invested over six and one-half billions of dollars in plant and equipment, and with an annual expenditure of $97.15 per capita of pupils or $17.31 per capita of population, amounting to over two billions and forty millions.

I hold that it is impossible to raise any logical argument in favor of the public schools which will not apply with equal force to the idea of public health. If we really believe that health is fundamental to the happiness of all people, if we are sincere in claiming that dental health is an important factor in general health, we cannot escape the obligation of including it in the list of those things which are proper functions of the state. If this is socialism, if this is paternalism, then so also are our schools, our highways, our postal system, and our police.

If preservation of dental health is capable of contributing to the betterment of general health, it is an economic problem as well. For it is well known that the loss of time and the lowered efficiency in commerce and industry due to sickness run into millions of dollars every year.

There is no need for any one's coercing us into a program of dental doles, panels and regimentation from the outside if we will but see our duty and do it. Instead of embarking upon a sea of endless patch and pull, repair and replace as the reformers would have us, with the hands of the "gimme boys" held out farther and farther from day to day; instead of attempting the impossible task of reforming the dietary habits of the people, let us formulate and establish a program of early care and education beginning with the children.

The state does not undertake to supply education for the adult, properly insisting that if he wants further training than the public schools provide for youth, he shall get it how and where he can. Why, then, should the state not limit its health measures to the care of children and youths, who are quite properly classed as dependents?

How can there be reasonable objection to the addition of only one-eighth of the cost per capita of education to the tax bill if that small addition will provide dental health to all?

As long as dentistry remains a profession, it will never be able to compete successfully with the merchandising methods which have placed a car in every garage, a radio in every home, and a wave on every girl and woman's head. No amount of preaching has ever made a child love spinach; the wise mother camouflages it or feeds it to the cow. But by beginning early enough

we can save the teeth of every child and establish habits of dental care that will remain with him to his advantage all through his life. We can thus at one stroke change the aspect of dental practice from the status of salvaging wreckage to one of conservation and upkeep.

The firm belief in all of the foregoing; the conviction that something can and should be done; the faith that if we want a thing hard enough we can have it—these have supplied the courage to propose the outline of a plan. It may not be perfect; I shall welcome constructive criticism; but, in the main, I believe it is one that can be worked. It can be adopted by any state so desiring, without interfering with whatever plans the American Dental Association may eventually agree upon in its social security program.

AN OBSERVATION CASE COMPLICATED BY PARTIAL IMPACTION OF ALL DECIDUOUS MOLARS, FUSION OF MANDIBULAR LEFT LATERAL INCISOR AND CANINE, AND CONGENITAL ABSENCE OF MANDIBULAR LEFT LATERAL INCISOR*

GEORGE R. MOORE, D.D.S., ANN ARBOR, MICH.

HISTORY.—The patient, a girl aged six and one-half years, called for examination on October 27, 1928. The father and the mother and, according to their account, all relatives of whom they had any knowledge, exhibit normal dentitions with only minor irregularities, if any. The mother reports for the girl a normal prenatal period, normal birth, and normal early infancy. The girl was breast fed for three months only, but the mother has been conscientious in matters of nutrition and rest, and has been careful to give the child the very best of attention by placing her in the hands of a competent pediatrician. She has suffered only two of the ordinary children's diseases, measles and chickenpox, and until recently she had never been subject to colds. She presented at that time evidence of hypertrophy of adenoid and tonsil tissue and was referred for a tonsillectomy and an adenoidectomy, which operations were cared for within two weeks after our original consultation. The child was of a somewhat nervous temperament, possessing at that time the last evidences of a thumb-sucking habit, a lip-biting habit of some severity, and a nail-biting habit. Figs. 1, 2, and 3 were taken on November 9, 1928. As will be seen in Fig. 3, the mandibular left deciduous lateral incisor and canine are fused, and there was no evidence in the radiographs of the presence of mandibular permanent left lateral crypt.

Attributed Etiology.—Unfortunately, my observation of the case began after the complete eruption of the permanent first molars. The mother reports that the deciduous molars had once been in occlusion. I can therefore account for the open-bite shown in the lateral views of Fig. 2 only very inadequately by referring to a possible circulatory or nervous disorder in that region of the developing maxilla and mandible. This might be attributed to a temporary feebleness of growth with the result that the normal tendency of the first permanent molars to assume more anterior positions in the head delivered stresses which actually caused the intrusion of the molars lying between them and the canines which were supported by more healthy bone. This is only a subjective opinion, not at all sustained by scientific evidence, and I am hoping some day to hear the real cause of intrusion of deciduous molars. As to the etiology of the fusion and congenital absence above referred to, I am just as much in doubt. These conditions whose more remote etiology I do not know are, themselves, however, the proximate etiologic factors in this case.

*Presented to the American Board of Orthodontia.

Diagnosis.—Bilateral maxillary and mandibular intrusion of deciduous first and second molars, complicated by fusion of mandibular left deciduous lateral incisor and canine and congenital absence of mandibular left permanent lateral incisor.

Treatment.—The case was kept under observation between October, 1928, and November, 1930. The mother was urged to break the thumb-, lip-, and nail-

Fig. 1. Fig. 2.

Fig. 3.

biting habits which she did by bribery. This is not ordinarily accepted as a good method, but the mother said she knew best how to handle her own child in this matter. The mother was advised to pay close attention to the child's habits of mastication. Hard crusts were prescribed with the idea of stimulating growth through function, if possible. By June, 1929, there was considerable gingival irritation at the cervical edge of the maxillary right second deciduous molar. It was therefore decided, inasmuch as premolars were present in their crypts as

shown by radiograph, to begin extracting the deciduous molars, following each extraction with a very painstaking observation of the spaces. The maxillary

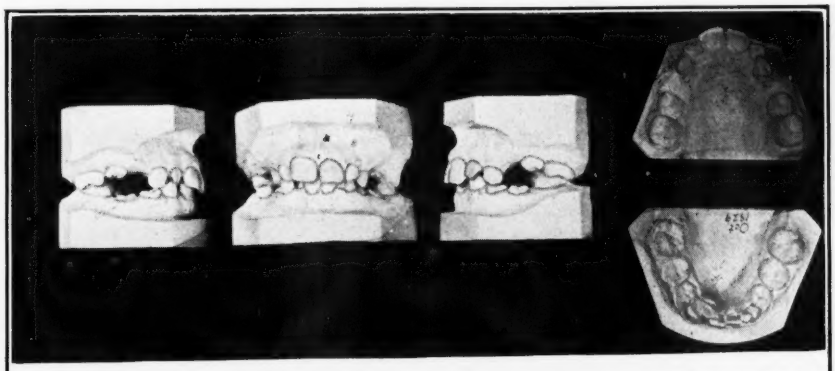

Fig. 4.

Fig. 5.

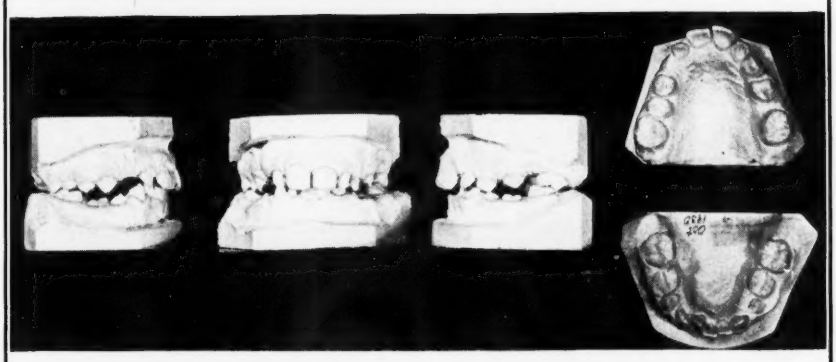

Fig. 6.

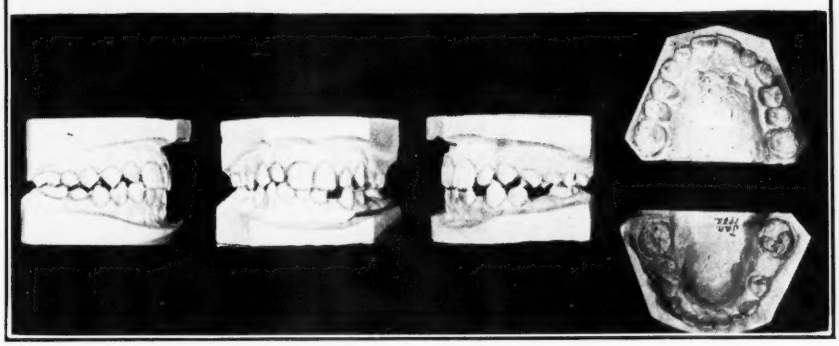

Fig. 7.

first deciduous molars were extracted in October, 1929, and the casts shown in Fig. 4 were made. Measurements were taken from the distal pit of the maxillary left first permanent molar to the mesial surface of maxillary left deciduous

canine. Immediately following the extraction, this measurement was 29.4 mm. One week later it was 29.3 mm. Four weeks later it was 29.2 mm., and, to my surprise, after five months' observation of this space, it showed a measurement of 29.7 mm. with absolutely no treatment. On the right side, the same observation of corresponding space was carried on with an original measurement of 30.1 mm., one week later 30.2 mm., four weeks later 29.7 mm., and five months later 30 mm., with likewise no treatment. Fig. 5 shows casts made in February, 1930. Without going into detail with respect to all other regions, measurements showed the same results and, as is shown in Figs. 2, 4, 5, and 6, which represent casts taken during the nontreatment period, the mandibular right lateral incisor region behaved in much the same way. In fact, progress was so satisfactory fol-

Fig. 8.

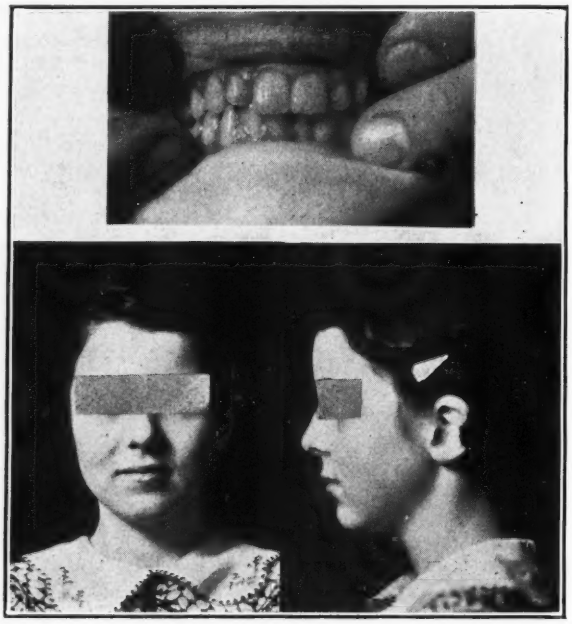

Fig. 9.

lowing the judicious extraction of the first and second deciduous molars, not more than two being extracted at any one time, that no appliances would have been considered necessary had it not been for the congenital absence of the mandibular left lateral incisor. In October, 1930, when, at the stage shown in Fig. 6, the first appliances were adjusted, consisting of mandibular lingual wire supported by half round tubes on first permanent molar bands, the permanent mandibular canines had just erupted, and it was considered advisable to stimulate development of the left canine region making a space by means of reflex springs for an artificial substitute in the lateral incisor region. This was done over a period of twelve months' active treatment with the results shown in Fig. 7, taken in January, 1932, and in Fig. 8, taken in April, 1932. After making the space for mandibular left lateral incisor, and with the aid of a maxillary lingual wire over a period of two months stimulating the maxillary incisor region, treatment was brought to an end in November, 1931. The patient now wears mandibular first molar bands supporting, by means of vertical half round tubes, a

symmetrical lingual wire on which is attached in the left lateral incisor region a Steele's backing and facing as shown in Fig. 8.

Results Achieved.—By referring to Figs. 7 and 8 it will be noted that results of this method of treatment have been very satisfactory. Despite the impacted condition of all of the premolars, much deeper in the process than it was normal for them to be, they have erupted normally, and, since November when the maxillary wire was removed, the occlusion seems to be settling even more satisfactorily. The mandibular left second premolar has erupted, and the mandibular left canine is rotating since it has come into occlusion with the maxillary. In a few months half round tubes will be replaced by horizontal round tubes to support the mandibular lingual wire, and at a later date when pulps of mandibular left central incisor and canine have sufficiently receded, a fixed bridge will be constructed by the patient's dentist to supply the lateral incisor. I consider the results achieved to date to be consistent with normal development at the patient's present age of ten years. Fig. 9 was made in April, 1932.

Prognosis.—From the very satisfactory nature of the development of this case since the removal of the appliances five months ago, there is no reason to expect relapse. With a space retainer such as the one described it will be necessary, however, to recement bands every four to six months and to keep careful watch of the condition of the enamel at the lingual cervical surfaces of teeth with which the appliance comes in contact. This patient has been relatively immune to dental caries, which fact also contributes to the favorable prognosis.

When I started observing this case I was not at all sure that the premolar regions possessed growth possibilities which they have proved to possess. From this case I have learned to look upon cases of progressive impaction of deciduous molars in otherwise normally developing individuals as less problematic than I supposed them to be.

HORIZONTAL TUBE AND HALF ROUND PIN ATTACHMENT

RAYMOND L. WEBSTER, D.M.D., PROVIDENCE, R. I.

THIS attachment is used with a removable lingual appliance for the following tooth movements: buccal or lingual tipping, and bodily mesial or distal movement of one or both of the anchor teeth.

Material.—Fig. 1, round buccal tube with inside diameter the same size as the lingual wire. On the bottom of this a half round post and lock wire are soldered, in the same manner as on the distal ends of a lingual appliance.

Manner of Placing.—The distal end of the lingual appliance, on which this attachment is to be placed, is left plain, with no half round post or lock wire. The attachment is then slipped over this end and the appliance placed in the

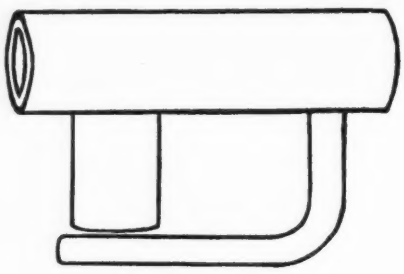

Fig. 1.

mouth. The half round post of the attachment is fitted into the half round tube on the molar band, and a scratch mark is placed on the lingual wire, mesial to this attachment. The lingual wire is then removed and a stop soldered at this point, which prevents the wire from slipping distal into the tube when in the mouth. The appliance is then placed, and locked in position, and, when the tooth movement has been accomplished, the attachment is slipped off the appliance, a half round post and lock wire are added to the lingual wire, and treatment is continued.

Fig. 2 illustrates a case in which the mandibular right molar is in buccal occlusion and, by using the attachment on this side only, this tooth can be tipped lingually. The left molar is attached to the lingual wire in the usual way with a half round post, so that any lingual movement would be bodily, and it is further reinforced by a fixed labial wire, to be ligated through to the lingual between the canine and the first premolar.

Fig. 3 shows the attachment slipped over the distal end of the lingual wire on the right side and ready to be engaged in the half round tube on the molar band. When the lingual tipping of this tooth has been brought about,

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the attachment would be removed and treatment continued, after soldering a half round pin and lock wire on the lingual wire.

Fig. 4 shows a case in which the mesial movement of the first molars and all premolars is desired, to correct the occlusal relationship of the buccal teeth. The attachments are used on both ends of the lingual wire and, with intermaxillary elastics, allows the molars to slide bodily mesially (no stops having been placed on the wire mesial to the attachment). This also allows the spaces between the premolars and the canines to be closed, restoring the contacts of these teeth. For stability the lingual wire is ligated to the in-

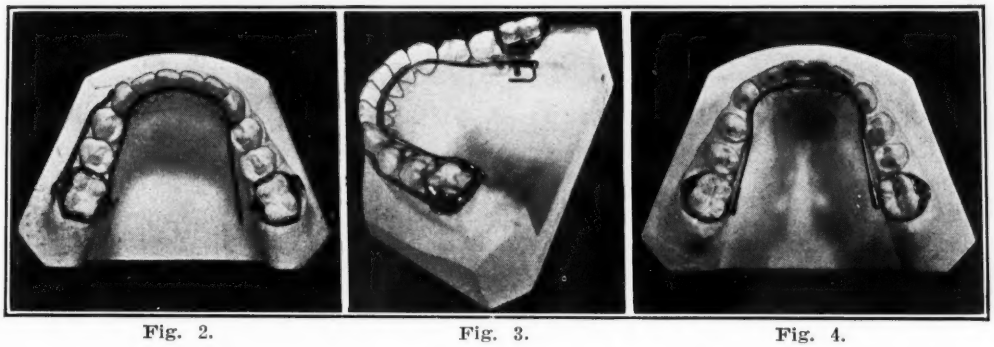

Fig. 2. Fig. 3. Fig. 4.

cisors. Other uses, than those illustrated, for this attachment are the buccal tipping of one or both of the anchor teeth, by having the attachment either on a lingual wire or on a labial, where, in the latter instance, treatment is to be continued with a vertical half round buccal tube, rather than a horizontal round tube.

The distal movement of a molar can also be accomplished with loop auxiliaries on the lingual wire, anterior to the attachment, but necessitating considerable anchorage in the anterior part of the arch.

The value of this attachment does not lie in its manifold uses but in its simplicity of construction, attachment, and dependability of action, in the above mentioned tooth movements. I have used it for the past five years and have found it very helpful.

Department of Oral Surgery

PRE- AND POSTOPERATIVE MANAGEMENT OF IMPACTED THIRD MOLARS

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THE last twenty years have shown a marked and favorable development in the technic of removal of impacted third molars. Prior to 1913 these malpositions were all operated on in the same general way without much regard for trauma, usually involving unnecessary bone destruction and frequently by sacrificing sound second molars.

Today, unfortunately, too much of the old-time modus operandi is in evidence, but as a whole the dental profession is handling these cases in a far saner manner. The credit for this progress is largely due to the stimulus generated by research workers in this field, most notably Winter of St. Louis, who presented an entirely new perspective when he developed his now standardized classification of impactions.

The journals and textbooks of recent years have been replete with information regarding the proper surgical approach to these abnormalities, and a discussion of individual operating methods is not in the province of this article. The preoperative care entering into these cases and the postoperative care given them have been somewhat neglected but are of definite importance in attaining successful results; hence this subject and this brief discussion.

I have often been startled on hearing general practitioners in dentistry remark that they do not encounter impactions in their practice, and I can only conclude that they are unobserving or are not thorough in making mouth surveys. More complete radiographic study might be illuminating and informative.

Granted that impactions are clinically evident or are disclosed only by the x-ray examination, they deserve serious consideration by the orthodontist, the periodontist, the prosthodontist, the pediodontist, the general practitioner, and the physician. Undoubtedly not all third molars in normal position, nor all impactions need to be viewed from the standpoint of surgical intervention, but a vast number which are now overlooked fall under the head of potential menaces to oral health, mental balance, and physical welfare. Far too often do they come to the dentist's attention only when acute pathologic involvements have so complicated the situation that deep neck infections endanger the patient's life. A large proportion of such serious sequelae could have been avoided by an early diagnosis and elimination of the impaction. The old adage of the horse being stolen before the door is locked is wonderfully exemplified in the cases of pericoronal infections which get out of hand. It is a fair presumption that the third

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molar which does not assume its normal position in the arch at its physiologic time of eruption constitutes a possible if not a probable trouble maker at some future period. If the evidence points to the presumable removal of the offending tooth at some time in an indefinite future, good judgment may indicate early surgical interference thus forestalling damage.

Impactions in the mouths of youthful patients are simpler to operate than those in middle or old age; the postoperative reactions are less, the convalescence is simplified and regeneration of tissue hastened.

It is not an uncommon occurrence to observe successfully completed cases of orthodontia upset by the pressure of unconsidered impactions. After retainers are finally removed, this constant force again disrupts the alignment, malocclusion recurs, and excellent regulative work goes for naught. Money has been spent in vain, the patient's cooperation has availed nothing, and the orthodontist's reputation suffers.

Traumatic occlusions and consequent pocket formations which come under the periodontist's treatment may readily be influenced by third molar pressure. If such be the case, is it not putting the cart before the horse to scale teeth periodically and attempt to readjust abnormal masticatory surfaces and allow the underlying pressure factors to go on without correction?

Has not someone overlooked something when the edentulous elderly patient finds the comfort and function of a well-fitting denture disrupted by the disturbances incidental to the efforts of eruption of an overlooked third molar? The extensive pathologic involvements commonly associated with these happenings are disconcerting, to say the least, to both dentist and patient.

It is regrettable that so many second molars in normal occlusion are allowed to become hopelessly carious on their distal surfaces because of the seeping of oral débris under the soft tissue flaps of the so-called partial impactions. It is also regrettable that erosions of second molar distal roots by third molar pressure are not more frequently forestalled. In this connection it should not be overlooked that if a second molar must be prematurely sacrificed, its antagonist on the opposing jaw elongates and often establishes pocket formation and malocclusion.

Reflex nervous disturbances often bring impactions into the medical field. These upsets may run the gamut from headaches, neck aches, pseudo earaches, eye pains, and antral symptoms to the more serious neuroses.

The partially erupted impaction, in general, is a more common disturber of the peace than are the completely buried types. Pericoronal pathologic condition is a distinct menace. The residual pockets under the overlying flap form an ideal locale for the breeding of Vincent's organisms and should never be overlooked in the clinical care of these cases.

From these brief observations is it not apparent that an early recognition of disastrous possibilities constitutes a definite obligation on the part of the dental practitioner? His good judgment, of course, should be the guide as to the indication of conservative or radical measures. In this survey it is well to note that sometimes apparently radical procedure is the more conservative.

If the decision is reached that an impaction should be removed, there are certain tangible preoperative factors to be analyzed:

1. Correctly angulated and processed radiographs.
2. A preoperative plan of procedure.
3. The choice of the anesthetic to be employed.
4. The office or the hospital for carrying out the work.
5. The general sanitation of the mouth and freedom from sepsis in the operating field.
6. Arrangements for postoperative care.

1. Surgical interference for the removal of an impacted third molar is indefensible unless the operator has obtained a complete and accurate radiographic visualization of the offending tooth and its contiguous structures. Aside from the clinical examination and the knowledge it imparts, he is able preoperatively to know exactly the tooth's position, its root formations and direction, the size and shape of its crown, its relation to the second molar, its proximity to the inferior dental nerve or antrum, the osseous resistance to be overcome, the amount of bone dissection necessary, the pathologic involvement of soft tissue, and the direction of the force to be applied. Without such advance knowledge his efforts are purely experimental and result in unnecessary trauma and unwarranted sequelae.

Intraoral films are more definite and accurate and less subject to distortion than extraoral plates and should be utilized unless the tooth in question is in such an abnormal position that the film cannot be used. A correctly angulated buccolingual radiograph is made first. The film should not be bent on insertion. The front border of the film should not be placed anterior to the mesial wall of the first molar. The rays should be directed at right angles to the film.

This picture properly processed will determine the correct anteroposterior position. If this examination shows the tooth to be in a linguoangular or lingual deflection, a second picture is made with the film in the same position and the rays directed as one would for x-raying a maxillary first molar. This will show the root formations which must be visualized before operation.

An occlusal picture determines the buccolingual relationship and offers information as to the mesiobuccal surgical approach. Only with this complete and trustworthy radiographic study is one justified in considering the operative factors. The average x-ray pictures made by the medical radiologist, the commercial laboratory, and, I am sorry to state, the dental practitioners do not fulfill the requirements; and more attention to these details will redound to the dentist's credit and, more important, to his patient's postoperative comfort and safety.

2. When a correct and complete visualization of the problem to be encountered is made, and only then, should operative measures be entertained. With this information obtained, the operator can then determine intelligently his instrumentation which should be so executed that a minimum of trauma to soft and osseous tissue is caused. The ideal to be reached in the removal of most impactions can be approximated only when the preoperative study has been so complete and so true that the operator is enabled to lay out his instruments in definite order and use them for a definite purpose in that order. The result may be

judged to a nicety, and empirical, time consuming, tissue destroying maneuvers eliminated.

3. The choice of the anesthetic should be made: first, in the patient's physical and mental interest; second, according to the dentist's ability to administer it safely and satisfactorily.

If these two conditions cannot be met satisfactorily, good judgment would indicate the employment of a professional anesthetist or the reference of the case to more competent hands. It is no disparagement on a dentist's ability when he recognizes that this operation is not in his realm, and certainly his reputation is enhanced among his clientele if he puts his cards on the table and affords his patient the same service that he would appreciate were he contemplating the same ordeal with himself on the receiving end.

In a general way the anesthetic choice comes down to a novocaine or a nitrous oxide and oxygen anesthesia in office practice. My experience from twenty years in this work leaves no room for doubt in my mind that in experienced hands the latter method is preferable. This does not mean that there are not indications for local anesthesia. Novocaine has many limitations, however, and the operator must always consider the possibilities of psychic shock.

This primarily not being a paper on anesthetics, I shall enter into no discussion of this subject other than to say that vinesthene and evipal are still in the experimental stage for this work, and ethylene offers no advantages to the man who is a competent anesthetist with nitrous oxide. Novocaine is the choice of the local agents.

4. Ether and avertin administration require the services of an expert anesthetist trained in the employment of these agents aside from the operator, with the definite rule that the patient must be hospitalized.

My inclusion of this subject is only the necessity for its consideration in outlining the preoperative plans.

5. Probably it is surprising to every one how well oral wounds get along in the presence of such unsanitary surroundings as are necessarily existent even in well-cared-for mouths. Nature is kindly disposed to the dental surgeon. Unfortunate sequelae to extractions are frequent enough, however, to make us more observant of contaminating influences, and it is a fair presumption that preoperative attention to every detail in asepsis can do no harm.

With the totally buried impaction which registers no clinical manifestation of a pathologic condition aside from a prophylactic treatment, probably nothing can be done on our part to help the situation further than scrupulous avoidance of introducing bacteria into the field. As a whole we can minimize postoperative complications if we consider every impaction which has to any extent invaded the mouth as an infected case. I refer to the generally understood partial impaction.

When the continuity of the mucous membrane has been disrupted, oral débris seeps under the pericoronal soft tissue, and there is a focus for postoperative complications. The old custom of incising these flaps often brings about reactions as severe as if the tooth had been removed. A medicated wick gently introduced into every nook and cranny of the area without traumatizing the

soft tissue accomplishes the result as well as an incision and aids in a resolution of these inflammatory areas. A good fundamental rule to follow is to avoid surgery if possible until the area is clinically as normal as can be attained. In acute manifestations, hot gargles, ice packs, restoration of good elimination, and general medication for discomfort should be carried on to aid in accomplishing the result. Certain emergency types, of course, need immediate surgical interference. But, by and large, it has been noted that many dentists invade these areas without giving sufficient attention to these details.

Alden of St. Louis recently brought out in a series of cases the fact that Vincent's organisms are a frequent causative factor in deep neck infections of dental and particularly third molar origin. Some of these cases had not been operated. Arsphenamine introduced intravenously and x-ray therapy seem to have broadened the margin of safety. Certainly evidence enough has been presented in the literature to warn us not to traumatize tissue in the presence of trench mouth.

A sane résumé of the foregoing is a warning to put these areas into as normal condition as possible before executing exodontia measures.

6. For satisfactory results, adequate postoperative attention is as much indicated as is operative skill. The case is by no means concluded on the removal of the tooth. Even under the most expert hands a wound has been created which offers the possibilities of an immense amount of discomfort and pain, as well as affording an avenue for the extension of infection and its disastrous ramifications. If the case has not been operated correctly, these possibilities become probabilities and often certainties.

In general, postoperative complications are proportionate to overtraumatization but the non-overtraumatized case may produce an unexpected aftermath. With the tooth successfully removed, the first requisite is the toilet of the area. The field has, of course, been walled off during operation to prevent the ingress of saliva. All débris is gently removed from the socket with suitable curettes; granulomato masses are delicately dissected out; osseous margins are smoothed with rongeurs, files or curettes; septal bone is cut down; and soft tissue flaps are allowed to fall back to their original position. If torn or lacerated, they are repaired by suturing or by cutting away parts which may become necrotic as a result of insufficient circulation. If drainage is indicated, a wick of medicated gauze strip is lightly inserted. This accomplished, the area is immediately isolated with a gauze compress to further the immediate formation of a healthy blood clot. An ice bag applied at once forestalls much of the commonly seen postoperative swelling and edema. The patient should bite lightly on this compress until the area is sealed. The ice bag is utilized in intermittent periods of ten or fifteen minutes, as long as puffiness of the cheek persists. Continuous nonintermittent ice application tends to discomfort. Medication for control of pain is utilized by the employment of general sedatives, barbiturates for nervous reactions, and opiates if necessary.

If the result is what we expect, the patient will be free from pain the next day, trismus will be absent, the cheek not at all or only slightly distended, and the operated area free from abnormal congestion and slightly stiff. Further

postoperative care is devoted to scrupulous attention to sanitation, and the patient must be kept under periodic observation until ready for dismissal.

If by chance, as now and then happens in spite of our preliminary measures, our operative care and our postoperative routine, the area does not respond properly, in addition to the above mentioned treatments it may become necessary to medicate the socket with sedative pastes, analgesic and antiseptic agents.

In any case, the operator is negligent who does not keep his patient in as comfortable a condition as is humanly possible in the light of our present knowledge. Any dentist who undertakes to remove impacted teeth should be fully prepared to meet any of the possible consequences of his surgical interference. Adequate preoperative precautions and intelligent postoperative management combined with a non-overtraumatizing operating technic will greatly lighten his burden and react to his patient's welfare.

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SELECTION OF THE ANESTHETIC AGENT FOR PROCEDURES IN ORAL SURGERY AND EXODONTIA

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IN ORAL surgical procedures the choice of the correct anesthetic agent is a most important factor in the success of the operation. The wise selection of the proper anesthetic is not always easy and simple. In these days of refinements in anesthetic technic and with the discovery and development of newer agents, the problem of selection for a specific case has become more difficult. Some men do not meet this problem because in their armamentarium there is only one or possibly two anesthetics from which to choose. Of course, it is very well for one to become proficient in the use of a single anesthetic; and if one had only this choice, that is, proficiency in a single medium of procedure, I would certainly urge that, rather than be mediocre in two, it would be better to become proficient in one. This attitude of mind, however, is likely to make one prejudiced and blind to the benefits of several other anesthetic agents. This would not be so bad if such an attitude was not unfair to the patient. Theoretically, the only man in a position to select intelligently the proper anesthetic for a given case is the man who uses all anesthetic agents equally well. This does not mean that he must be able to give each of every anesthetic agent but rather that he must know their various indications and contraindications and by such knowledge choose the best anesthetic for the particular operation at hand. Certainly as a surgeon he should be able to operate under any type of anesthetic.

Broadly speaking, all anesthetic agents can be divided into general anesthetic agents and local anesthetic agents. They all have their place, and they should all be used with equal enthusiasm. Let us examine some local anesthetic agents.

Today we have at our command novocaine, butyn, cocaine, to name only a few of the more commonly used local anesthetic drugs. Because of its ease of administration and its lack of toxicity, novocaine has enjoyed tremendous popularity in all branches of dentistry. Its use has been a great boon to the profession. Because of its ease of application, one should not fall into the habit of thinking that novocaine can be used for all cases. There are certain types of cases in which novocaine should not be used, as for instance, the acute type of infection centering about the mandibular third molar. Usually associated with such conditions is a definite trismus, and the acute inflammatory process extends back into the peritonsillar region and up the ramus. In this type of case I believe that a local anesthetic has no place.

Now if the same kind of an acute infection exists in any other part of the oral cavity, the use of a local anesthetic either is contraindicated or at best is certainly limited in its usefulness. I say limited in its usefulness because

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it is definitely known that inflamed tissues will not absorb the local anesthetic agents sufficiently to produce perfect anesthesia. We have had the experience of obtaining all the signs and symptoms of a perfect anesthesia from a properly executed mandibular injection when it is our desire to remove a sore mandibular first molar and yet when the forceps were applied to the tooth the patient experienced considerable pain. The second molar or the first bicuspid could be removed painlessly, but the sore mandibular first molar could not. Around the apex of a sore tooth is an area of inflammation which seems to insulate the tooth against the effects of the anesthetic agent. This is the type of case in which most of us resort to vocal anesthesia, but usually talk is of no avail. The patient has been hurt and is therefore disappointed. Remember, when a patient comes to you for painless surgery, he wants anesthesia, and anesthesia means the lack of pain. Therefore, let your anesthetic technic be more local than vocal.

Another type of case in which a local anesthetic is not indicated is the acute alveolar abscess swollen to immense proportions. In such a case the face is usually swollen, the eyelids are closed and edematous, the patient is haggard and weary from a sleepless night of pain. He comes to you tired, toxic and exhausted. The pressure within the tissues is so severe as to cause the most excruciating pain, and it is foolhardy to believe that the use of a local anesthetic in such a case will be of any avail. To inject a solution is to increase the pressure within the tissues, which means more pain and also there is danger of spreading the infection. In this case a light general anesthetic intelligently employed will allow the abscess sac to be evacuated painlessly. When the patient awakes, he is relieved and his thankfulness for the benefits of modern science is unbounding. I have seen an ethyl chloride spray used in such cases, and I have seen the superficial tissues achieve anesthesia by refrigeration; but when the knife was applied to the tissues and pressure exerted, there was pain in the deeper tissues which the ethyl chloride could not reach.

Every once in a while patients say that they cannot take novocaine because they have an idiosyncrasy for it. Again certain patients get weak and faint every time they are injected with novocaine. I am inclined to think that this is not due to the novocaine but rather is due to the use of epinephrine. Of course, syncope can be due to psychic shock. There are patients who faint whenever they receive a hypodermic injection even though sterile water is used. In such cases, it is our practice to place the patient in a prone position and encourage him to relax. An environment of silence and tranquillity is desirable. The operator's movements should be quick and confident. It is well to reduce the amount of adrenalin in the solution and in some cases to eliminate it completely. Dentists have the habit of using too much adrenalin in their solutions. I would advocate endeavoring to use smaller amounts of this drug in local anesthetic work.

Recently newer agents as vasoconstrictors have been suggested. One of these is corbefrin. This is a good agent but does not replace adrenalin, and further clinical use of it is necessary before definite opinions regarding it are expressed.

At this point I would dare make the statement that 90 per cent of all surgical operations in dentistry could be done under a local anesthetic. Of this percentage, however, I am sure that there are certain types of cases requiring certain technical procedures which could be done best under a general anesthetic. There are certain types of patients so emotionally constituted as to suffer great mental anguish if subjected to the experience of having an operation performed upon them while they are conscious. Then again there are certain diseases in the presence of which a local anesthetic might be a detriment to the patient. It is just as wrong to insist upon a local anesthetic when a general anesthetic is indicated as it is to insist upon a general anesthetic agent when you know that the proper agent would be a local anesthetic. It is a poor rule that will not work both ways. I would urge you to select the anesthetic carefully. It should be chosen with a view to the comfort of the patient, facility for the operator, and success to the operation.

I realize that I have not covered the entire field of local anesthesia, but I have given a few pertinent thoughts which point the way in which an enlightened surgeon should choose an anesthetic. Now let us consider general anesthesia. In surgical practice one is impressed with the fact that there are certain patients who insist upon going to sleep when any work is done for them. There are others who insist just as strongly that such should not be the case. In fact there are some people who dread losing consciousness. Most of these patients dread to lose consciousness because of some previous unpleasant experience under a general anesthetic. They remember that during childhood when they broke their arm or had their tonsils removed they were placed on a table, a cone was placed over their nose, they were held tightly and with force, some irritating and strangulating odor was forced upon them until they lost consciousness, and upon regaining their faculties they were nauseated and sick for hours with a peculiar burning pungent odor hovering over them. At best, operations are not pleasant, and they are particularly not pleasant when associated with a painful surgical ordeal. The result is that when any effort is made to place a cone over their mouth they will struggle and fight and want to take another breath of fresh air. They will make all manner of excuses for postponing initial inhalation. When a patient objects to this particular method, we, as operators, should realize that it is not necessary to give him an inhalation anesthetic in order to achieve narcosis. Today we have at our command rectal anesthetics and intravenous anesthetics which are very good and are particularly well adapted to mouth operations. I refer now to avertine and evipal.

Avertine anesthesia is usually administered by rectum as an enema. In fact most anesthetists tell the patient that he is to receive an enema. The initial work can be done in the patient's room, and within fifteen minutes, while the patient is talking to his nurse or friends, he will suddenly become drowsy and fall off to sleep. The patient is then wheeled to the operating room; the operation is performed and the patient brought back to his room to remain in a pleasant semiconscious state for several hours. The next day when all faculties are restored, after a restful night's sleep, he will have no remembrance of the previous day's experience except that of a comfortable

semiconscious condition. It is not necessary to give large doses of avertine in order to achieve anesthesia. Rather, the anesthetic should be used as a basal anesthetic and smaller quantities of the drug used rather than massive doses. The usual amount is about 80 per cent. If during the operation the patient should move, it is an easy matter to supplement the avertine anesthesia with a light inhalation anesthetic agent.

Where the operation is to require only a few minutes' work, such as the opening of a cervical abscess or the reduction of a fractured jaw, the use of evipal by the intravenous route can be used. Evipal is injected into a vein in the arm, and the patient is instructed to count ten; often before the patient can reach the number five, he is sound asleep and, on the average, will remain asleep at least ten or fifteen minutes. There are anesthetists who do not advocate the giving of the entire dose of evipal at one time but rather continuing its induction into the vein over a period of many minutes; by such a procedure they contend that they can keep the patient asleep as long as the operation requires. Further research along this particular line is desired before free use of the agent is recommended. I suggest these two newer anesthetic agents as possible avenues for the patient who dreads an inhalation anesthetic.

Chloroform anesthesia is not used extensively in this country; although it has its place and is a useful agent.

Ether anesthesia is still the sturdy handmaid of surgery that it has been since the memorable day October 16, 1846, when Dr. Morton first used it in Boston. It, however, is being replaced gradually by the gas anesthesias, such as nitrous oxide and ethylene. Ethylene gas in combination with oxygen is used where complete relaxation is required. Since complete relaxation for the average dental operation is not needed, its use in dental surgery has not been popular. Most dental offices are not equipped to eliminate the possibility of explosion; therefore dental attention has been directed toward the nonexplosive gases, such as nitrous oxide.

Nitrous oxide gas, when used in combination with oxygen, is by far the most desirable agent for general anesthetic purposes in dentistry. In the cases in which relaxation is necessary, a little ether may be added to the nitrous oxide and oxygen combination. In the early days nitrous oxide and air were used to achieve anesthesia for extraction. The technic was one of saturation and recovery, and this particular method led to the hasty extraction of teeth, and the result has been that today many dentists still believe that under a nitrous oxide and oxygen anesthesia they must hurry. This is a misconception because with the addition of oxygen to the nitrous oxide a controllable anesthetic agent is achieved which allows the operator to keep the patient asleep as long as may be desired. Patients can be kept asleep with nitrous oxide and oxygen anesthetic as long as five or six hours with complete safety.

In using nitrous oxide and oxygen anesthesia, however, one should be as careful with it as with any other anesthetic agent. It is not the whiff of gas that many people believe—that all one has to do is to place a cone over the nose and inhale a few vapors and so go to sleep. On the contrary, a nitrous

oxide and oxygen anesthetic for oral work requires the strictest application to administration detail and alert observation of the patient. In fact, a nitrous oxide and oxygen anesthetic for mouth work is more difficult to administer than the same anesthetic for an abdominal operation. There is more opportunity for the free ingress of air after the mouthpiece has been removed. Although some of this may be eliminated by careful packing of the mouth, nevertheless a constant even flow of gases to the patient is difficult to maintain. Right here I want to impress you with the fact that all patients are not suited for nitrous oxide and oxygen anesthesia. There are certain types of patients, such as the athletic, the alcoholic, the drug addict, and the severely frightened person, to mention only a few, who as a rule are poor subjects for straight nitrous oxide and oxygen anesthesia. In such a case one is wiser in using a little ether in combination with the nitrous oxide or in using ethylene. This is particularly true where the operation is to be of short duration. On the other hand, if the operation is going to require thirty minutes or two hours' time, I would recommend the use of a basal anesthetic, such as avertine, supplemented if necessary by nitrous oxide and oxygen.

Besides the types of persons whom I have cited as being unsuited for straight nitrous oxide and oxygen anesthesia, there are other types which present certain difficulties. The patient who is extremely toxic, such as the patient with an acute cervical cellulitis, should be given an extremely light nitrous oxide and oxygen anesthetic or a smooth ethylene anesthetic, as he does not as a rule tolerate much deoxygenation. Anemic persons also require careful consideration and should receive during the administration of the anesthetic an increased amount of oxygen. The obese person is usually regarded as a poor nitrous oxide and oxygen risk. I cannot agree with this, as I have seen many heavy persons take the smoothest anesthetic. This type of patient, however, should be watched very carefully because if he did stop breathing under the anesthetic, it would be difficult to give him artificial respiration because of his bulk, and for this reason a light inhalation anesthetic should be the rule. This does not mean that such patients should not receive an inhalation anesthetic but rather that they should be handled with extreme care. A type of patient who, as a rule, is very difficult under an inhalation anesthetic is the short thick-necked individual with the florid complexion. In such a case, there is very little airway; the tongue seems to fall back in the throat, and the patient has a tendency to stop breathing very readily.

I have purposely reserved for last the topic of premedication. The successful application of premedication to all types of surgery is founded upon sound principles of practice. Its use means that less of the anesthetic agent is necessary. We, as dentists, have been accustomed to operating under all sorts and all kinds of unfavorable conditions. Dental surgery is just as important as any other type of surgery. Certainly it requires as much care, skill, and consideration as any other; yet when an operation is to be performed in a hospital, no matter how minor, invariably preoperative preparation of the patient is insisted upon, and this usually means preoperative

medication. In most instances the patient is required to go to the hospital the night before the operation; a narcotic agent is given at bedtime in order to lull the patient into a restful night's sleep. Early the next morning the patient is given more premedication, usually a sixth or fourth grain of morphine with or without atropine. The patient is wheeled to the operating room in a semiconscious state, the anesthetic applied and mainly because of his relaxed condition the patient goes off to sleep easily. Such preparation makes many patients more amicable for inhalation anesthesia who would otherwise be very difficult.

But consider the dentist's problem. The patient may have had a large meal; he is on his lunch hour, has a tooth that is bothering him, and decides to go upstairs and have the dentist remove it. The operation is started under a local anesthetic and unfortunately the tooth breaks. After several minutes of diligent application of the elevators and forceps, the patient becomes hysterical, excited and nervous and insists upon going to sleep. As the patient will so often express it, "Doctor, please give me a whiff of gas and get this over with." With such a patient in such a state of mind and with a full stomach, to apply a nitrous oxide and oxygen anesthetic in a dental chair without sufficient assistance, with the temperature of the room either too hot or too cold, is to invite trouble. The dentist is expected to put the patient to sleep and remove a difficult root which he was unable to remove under a local anesthetic. For some reason the patient thinks that a general anesthetic makes the operation easier. If the dentist should fail, he is criticized as lacking ability.

Compare the conditions under which the dentist has to work and the conditions under which the patient's appendix is removed if the hospital procedures as outlined are followed. Is it fair to the dentist to expect him to deliver the same satisfaction that ideal conditions would enable him to give? But after all who is to blame for this condition? The fault lies with the dentist himself. We should insist upon the proper preparation of all our patients before they are given any type of anesthetic. Premedication in the use of a local anesthetic is often as important as in the use of a general anesthetic. Premedication requires time, and it also requires certain types of rooms that are not always available in dental offices. We should, however, equip our offices so that we have these facilities if we are going to use either local or general anesthetic agents in order to render the best possible service. We can render our best only under ideal conditions.

In the last few years the barbiturates have been widely used, and they have been found particularly adaptable for premedication in dental cases. There are certain patients on whom the barbiturates seem to have no effect, and in these cases we use morphine, usually between a sixth grain and a fourth grain one-half hour before operation. In certain patients morphine seems to produce postoperative nausea. There are other agents, however, which can be used for premedication, but we have found in our practice that these two agents are satisfactory for the majority of patients.

A chronological study of the advancement made in anesthesia leads one to predict that in the future instead of the surgeon's depending upon one

agent in order to achieve anesthesia, he will use a combination of such agents; but as the result of such a procedure, he will use smaller amounts of each drug. The trend today in the better clinics is toward balanced anesthesia; by balanced anesthesia I mean the application of all those agents in such a way as to make the patient's trip to the operating room a pleasant one; free from apprehension, nervousness and fear. We do not have to wait for that far-off day; it is here now if we will intelligently apply the agents and tools that are at our command.

SALIVARY CALCULI*

ROBERT H. IVY, D.D.S., M.D., F.A.C.S., AND LAWRENCE CURTIS, A.B., D.D.S., M.D., F.A.C.S., PHILADELPHIA, PA.

THIS report is not intended to cover the subject of salivary calculi but is rather, an addendum to a previous contribution[1] published in the *Annals of Surgery* for December, 1932.

At that time we reported seventy-three cases of salivary calculi, sixty-six connected with the submaxillary gland or duct or both, and seven with the parotid, a proportion of about ten to one. Our present report represents a total of one hundred and fifteen cases in which calculi were present, one hundred and six connected with the submaxillary gland or duct or both, and nine with the parotid salivary apparatus, a proportion of about twelve to one.

We have never been able to satisfy ourselves that the sublingual gland or its ducts were the seat of any such stones. In some instances calculi in the anterior part of the floor of the mouth have been deeply embedded and apparently, at first sight, connected with the sublingual gland or ducts, but when we have removed these stones we have found them to be invariably in the anterior portion of the submaxillary duct. In these few cases there was neither visible nor palpable enlargement of the gland itself to assist in the diagnosis.

It would be but a mere repetition of our previous article to dwell at length on the etiology, symptomatology, diagnosis, and treatment of salivary calculi, but there are a few pertinent facts which will bear repeating.

The actual cause of calculus formation within the mouth remains apparently still unproved. Following the significant work of Söderlund[2] and Naeslund[3] of Sweden, in 1927 and 1929, respectively, both of whom found a direct relationship between calculus formation and the presence of actinomyces, in two independent series, we examined some of our specimens for the presence of these fungi but met with little success. Perhaps there is a difference in the pathologic make-up of Scandinavian and American salivary calculi. At any rate, calculi do form, and there seems little that we can do about it but to diagnose and then remove them. When we learn more of the chemistry of saliva and its relation to general metabolism, then we may come to know more of the real cause of calculus formation in the salivary glands and their ducts.

Enlargement of the submaxillary salivary gland is often mistaken for a lymphadenitis or a cellulitis due to infection from the tonsils or teeth or some other intraoral focus. The lymph glands are more superficially situated and usually posterior to the salivary gland; the cellulitis, usually from tooth infection, is diffuse, and there is almost invariably an associated trismus with more or less fixation of the tissues. The salivary gland, when enlarged from stone in the

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duct or gland itself, is usually more deeply seated, is not fixed to skin or bone, centers in the submaxillary triangle, and offers no limitations to the movements of the mandible. X-ray studies almost always settle the question.

It is important again to emphasize the confusion that persists about the so-called ranula. "Statements are constantly appearing in the medical and dental literature[4, 5] that ranula, a cystic swelling of the floor of the mouth, may be due to a calculus lodged in the duct of the submaxillary gland. Submaxillary duct obstruction cases should never be classified with ranula, because the symptoms are entirely different. Ranula is a soft, painless, transparent swelling beneath the mucous membrane of the floor of the mouth, containing clear, ropy fluid. The exact cause is unknown, but it may be due to inflammatory closure of one of the ducts of the sublingual gland or one of the smaller mucous glands in this region. It is never associated with a calculus, nor with a swelling in

Fig. 1.—Typical enlargement of submaxillary gland due to obstruction of Wharton's duct by calculus. (From Blair and Ivy, *Essentials of Oral Surgery.*)

the submaxillary region, as would be the case were the submaxillary duct involved. Furthermore, in ranula the submaxillary duct can usually be identified and isolated completely from the cystic swelling."[1]

Submaxillary Cases.—(106.) Seventy-one occurred in males and 35 in females, a proportion of about two to one. The ages of the patients ranged from sixteen to seventy-nine years, and the average age for all patients was a little over forty years. Fifty-seven of the calculi were on the left side; 43 on the right. Two were bilateral, and in 4 cases the side was not noted. Roentgenograms were not taken in all cases, largely because of the obvious presence and location of a single stone, but in the 73 cases in which they were taken, the stones were demonstrated in every instance. The calculi were actually demonstrated clinically in but 55, or about 50 per cent of the cases. Definite enlargement of the gland was visible or easily palpable in 92 instances.

In 84 cases the calculi were removed through the mouth; in 11 cases the gland was removed; and in 11 cases no operation was performed because of the refusal of the patient to submit to surgical treatment.

In our first published series the number of stones per case was not noted. In the 40 cases since 1932 there were single calculi in 27 of the cases, double in 10, triple in two, and quadruple in one.

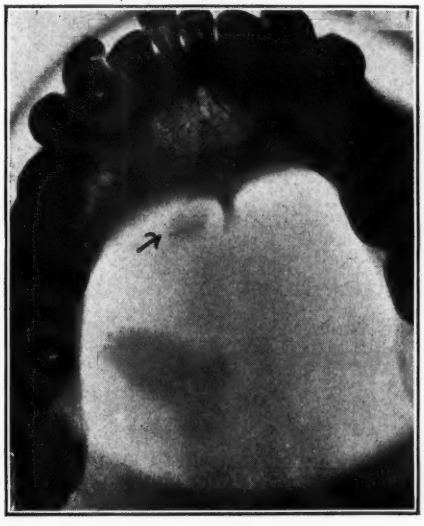

Fig. 2.—Occlusal film of mandible, showing small calculus in Wharton's duct near orifice.

Fig. 3.—Extraoral roentgenogram of same case as shown in Fig. 2. A second large calculus shown far back in submaxillary duct near gland. This could not be demonstrated by the intraoral film.

Two patients have returned with the formation of more calculi. The first came back after two years with a single calculus on the same side as the first one; the second after two and one-half years with a single calculus on the opposite side. These stones were removed in each instance.

Parotid Cases.—(9.) Of the 9 parotid cases, 6 occurred in males and 3 in females. There were 4 calculi on the right side, 5 on the left. Roentgeno-

grams showed the stones in 4 cases; in 4 they were palpable. In all cases there was a visible swelling in the parotid region. Seven of the 9 stones were removed by intraoral operations into the duct; one stone spontaneously delivered itself after repeated dilation of the duct with small bougies. The other was encysted in the gland and removed through an external skin incision. There was no obstruction of the duct in this case, consequently no permanent salivary fistula resulted.

Treatment.—The treatment of salivary calculi is essentially surgical removal of the stones. We have nothing new to offer in this respect, and so, again, refer to our previous paper. It is well to emphasize, however, in conclusion, the anatomic relationship of the submaxillary salivary gland. There are several important structures which approximate this gland which must be identified and properly dealt with if the gland is to be excised. The gland lies in the submaxillary triangle, deeply situated and not normally palpable. It curls around the posterior border of the mylohyoid muscle and extends for some distance in the floor of the mouth from which portion the duct is given off. The incision should be made well below the border of the mandible to prevent possible section of one of the cervical branches of the facial nerve which innervates the triangularis menti muscle. The facial vein lies superficial to the gland and should be divided and ligated. The lingual nerve lies immediately above the prolongation and should be isolated and kept out of the field of operation by a blunt hooked retractor. If the nerve is severed, a unilateral anesthesia of the tongue will follow, which may be permanent. The facial artery usually grooves the gland on its deeper surface but may enter its substance. When exposed, this should be divided and ligated. The hypoglossal nerve lies beneath the gland, as do the lingual artery and vein. These structures should be avoided, particularly the nerve, because its injury will cause a motor paralysis of the affected side of the tongue, with deviation to that side. When the gland is elevated, it will be seen to form the upper boundary of the small lingual triangle.

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CANCER OF THE CHEEK AND NEIGHBORING BONE*

VILRAY P. BLAIR, M.D., F.A.C.S., JAMES BARRETT BROWN, M.D., F.A.C.S., AND LOUIS T. BYARS, M.D., ST. LOUIS, MO.

SQUAMOUS epitheliomas arising upon the buccal mucosa may quickly involve either or both alveolar processes. From the upper gum they can involve the palate or antrum with equal facility. Conversely, such growths arising upon the hard palate or either alveoli are liable to spread to the buccal mucosa, but these growths do not invade the inner surface of the mandible, the floor of the mouth or the tongue in the early stage. When the tongue is affected, it is usually by way of the faucial pillar.

This tendency to reciprocal invasion is one reason for grouping these growths together in discussing cancer of the mouth. Another reason is that cancer of the inner surface of the cheek, hard palate or gums is not so amenable to radiation therapy as are cancers arising elsewhere in the mouth. These growths are not only comparatively resistant to radium treatment, but, in the neighborhood of bone, the application of radium is more difficult. A radium burn of the bone is extremely painful, and for a very long time, so much so that it may be advisable to destroy the damaged bone with the cautery in order to control the pain and hasten the separation of the dead bone. Therefore, in attempting to cure operable cancer of the cheek or alveolar process, we prefer surgical destruction to radiation, and as these growths, especially on the lower alveolus, tend to involve lymphatics early, their removal may be easily combined with the destruction of the primary growth.

In reference to the mandible, at least, the term "cancer of the jaw" is misleading and ill advised, for, with the exception of rare instances of metastases from some distant site (and, still rarer, development from dental epithelial rests, Fig. 4), the growth arises primarily from the mucosa, the bone being involved only secondarily either from the mucosa or from an infected gland. Direct extension from the mucosa usually spreads along the surface with relatively little deep erosion of the bone. (Figs. 1 and 7.) In a very small percentage of the above cases, the bone may be deeply involved, the growth once in the marrow cavity apparently showing a preference for growth in the bone. (Fig. 2.) Extension from a buccal gland tends to destroy the bone rapidly and widely. (Fig. 3.) Nevertheless, when the bone is involved, its destruction or removal should be an incidental and not a primary objective of the treatment, and the primary removal of the body of the mandible for the cure of squamous epithelioma is probably not a justifiable procedure.

The surgical indications are here most conservatively and effectively met by the plan outlined by Bloodgood, which consists in removing the upper

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lymphatic areas and exposing the involved parts of the cheek and bones by sharp dissection, wide destruction of the bone and primary growth by cautery, and partial repair of the external incision. Where the cancer has extended to the tongue, soft palate or posterior pillar, gold radon seeds are implanted simultaneously. The details of our adaptation of this principle will be found in the diagrams. (Figs. 5 and 6.)

The through-and-through heating of the full section of the contiguous and neighboring bone insures the destruction of the cancer cells contained in

Fig. 1.—Deep excavation of bone by direct extension. This may occur even with low grade, verrucous growths that may be thought to be benign.

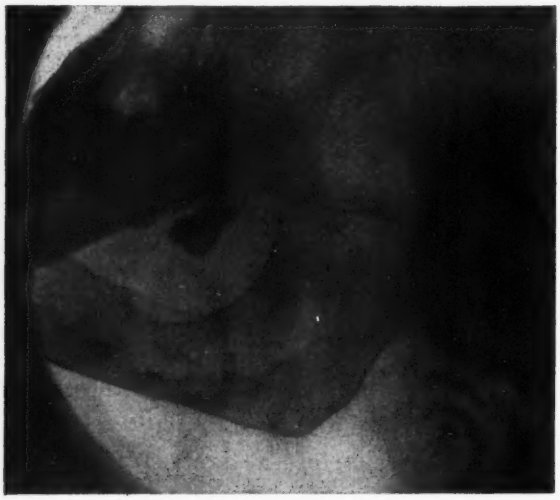

Fig. 2.—Widespread involvement of entire marrow cavity extending up ramus. This is a definite though infrequent type of extension of squamous cell carcinoma, in which there is no secondary involvement of soft tissues but very rapid progress through bone.

In this patient the original lesion was on the lip, and there never was any local recurrence. Growth progressed with extreme pain, but the condition was unrecognized for some months because of a suspicion of actinomycosis.

the area, and, temporarily, preserves the continuity of the mandibular arch, thus greatly lessening postoperative respiratory infection. It also preserves proper occlusion of any remaining teeth. Six to twelve weeks later the burnt segment comes loose and is removed, and this insures subsequent free opening of the mouth, even when extensive destruction of the cheek lining has been done. (Fig. 7.) After the bone has been removed, the remaining submaxil-

lary fistula can usually be closed easily. A Mikulicz tent dressing, put in through the submaxillary fistulas on both the buccal and the lingual side of the burnt bone, keeps the mouth clean and water-tight for several days, and

Fig. 3.—Carcinoma involving jaw secondary to gland involvement. This patient had cancer of lip eight years before and five years later had been reported as cured. Three years later he returned with hopeless involvement of glands and bone that had been present for one year.

From glands, cancer may rapidly spread to bone, causing wide destruction of lower border as shown.

Fig. 4.—Complete loss of bony structure in the mandible on both sides, without evidence of original mucosal lesion. Biopsy showed squamous cell carcinoma, and this is thought to be a true case of carcinoma of jaw arising from dental epithelial débris, peridental débris of Malassez.

greatly lessens the danger of spreading infection and secondary hemorrhage that are liable to follow primary suture of the floor of the mouth.*

*If the continuity of the jaw cannot be preserved for any reason at the time of operation, a tracheotomy will be necessary, as the pharynx collapses and the air-way cannot be maintained.

The cauterization is done under chloroform anesthesia; a large rubber breathing tube (one inch in diameter) is placed through the mouth into the pharynx so that the patient does not breathe in the smoke. The patients are prepared for chloroform by giving them sodium bicarbonate and sugar in large doses; after operation they are given glucose intravenously and for several days sodium bicarbonate and excess sugar through the feeding tube. (This, of course, cannot be the routine treatment for diabetic patients.) With these precautions and careful administration of the chloroform at the time of operation, there should be no extra ill-effects from this anesthesia over any other type available. Ether may be given during the preliminary sharp dissection if it is gotten rid of before the cauterization.

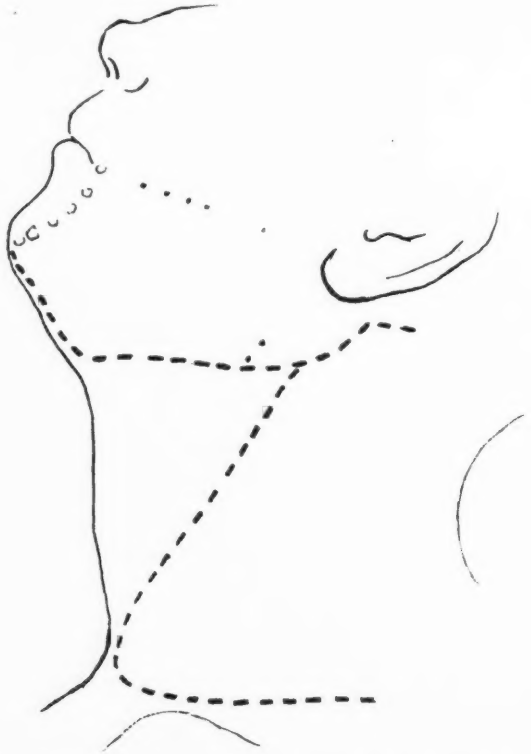

Fig. 5.—Incisions of approach for making a combined removal of primary growth of gum, palate or cheek, with related lymphatics. Dashed line is approach for a complete removal of submental, submaxillary, buccal and deep cervical lymphatics. Line of circles through full thickness and line of dots through mucosa, in conjunction with upper transverse part of incision, is used to retract cheek for wide simultaneous exposure of buccal cavity and upper half of neck. Above exposure in conjunction with section through mandible in front of angle gives better approach to posterior part of mouth. (Figs. 5 and 6 from *Annals of Surgery*, October, 1933.)

These patients are best fed through a pharyngeal tube, usually inserted through the nose at the time of operation. The pharynx is kept free of clogging mucus with gentle cleansing or suction. The patient is allowed to assume sitting or semi-sitting position and kept comfortable with morphine when necessary. Though many of these patients are already enfeebled, they usually go through the operation without showing much let-down for two or three days, but, following this, there may be a gradual slump which, once established in elderly people, is a prelude of death. One of the most effective pre-

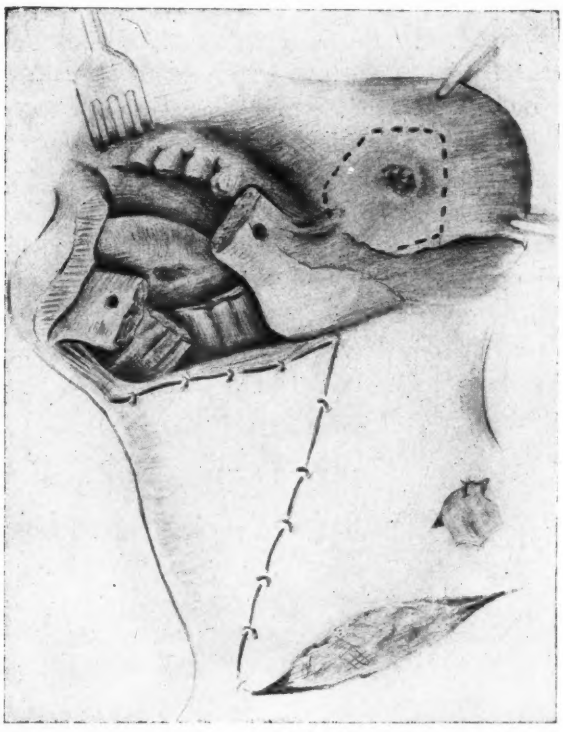

Fig. 6.—Plan for simultaneous elimination of lymphatics of neck and destruction of growth that had originated in cheek, but, at time of operation, involved also alveolar process, neighboring part of tongue and posterior submaxillary lymph node.

After completing neck dissection and establishing drainage, the lower incision was sutured, and above, edge of flap was sutured to digastric muscle. Latter will slough where sutures engage, but will have given protection and healing opportunity to carotid area and stump of newly ligated facial artery. Incision alongside of lip was then completed, cheek flap elevated and bone drilled and then divided with a Gigli saw. Cheek growth was removed with a cutting cautery; posterior bone fragment with its attached growth was thoroughly cauterized with good-sized soldering irons, and tongue area was treated by inserting radium needles (but gold radon seeds would have been our preference). In a case in which there are not available teeth to anchor mandible to maxilla, any late slipping at site of bone cut might spell disaster. In this case bone ends are best united with a fine lacing silver wire or loop of iron wire that brings ends into firm contact. Then wound is closed from corner of mouth to hyoid bone, and a balsam of Peru iodoform gauze pack in a tent is placed snugly in submaxillary region so that it contacts all raw surfaces without undue bulk.

Fig. 7.—Segment of bone from above angle clear forward, which has been destroyed with cautery and is now detached and ready to be removed.

Destruction along alveolar region by growth itself can be seen. In this instance the jaw was not sectioned at the time of operation.

ventives is an early postoperative blood transfusion before there are any definite signs of its need. In those accustomed to the use of alcohol either past or present, its postoperative use had best be routine. Close attention to these and other details of comfort and maintenance of a clear air-way will tend to prevent postoperative deaths. These severe mouth operations are not infrequently followed by a period of mental aberration and restlessness which, to those familiar with the picture, is more distressing than alarming. The patient's mind clears in one or several weeks when normal air-way, normal eating, and normal communication have been reestablished. In this plan of treatment, although no claims for brilliant results are made, a sufficient number of patients are well to justify continuing with the plan for the present.

For inoperable cases, massive external radiation is used which we may hope will some day displace all operative treatment.

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Department of Orthodontic Abstracts and Reviews

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Prevention and Cure of Occupational Diseases of the Dentist. By Dr. William Lintz, J. A. D. A. **22**: 2071, 1935.

The dentist, who because of his calling should be expected to be practically free of disease, suffers much from occupational disease and from sickness which is preventable. This is the more unfortunate as his income ceases when his health breaks down, and fitness is absolutely necessary because of the heavy physical strain connected with his work.

Eighteen points should find attention in the dentist's health program. They are: (1) *Complete medical examinations* twice a year, including examination of blood, urine, and feces, basal metabolism, roentgenograms, electrocardiograms, etc.

(2) *Posture.* The prolonged standing in one spot and leaning sideways toward the patient strains the muscles and ligaments of spine, pelvis and feet (especially one foot), causing flat feet, varicose veins, genu valgum, lordosis or kyphosis of the spine, pressure and displacement of the heart, and interference with respiration.

The use of a rotary chair is helpful; muscles, ligaments, and bones of the spine can be strengthened by exercise, hydrotherapy, swimming, massage, and cod liver oil therapy. Varicose veins are treated by bathing and bandages before they cause ulcer formations, muscle cramps, and ruptured veins. Flat feet are best treated by exercises specially designed to develop various muscle groups (toe gripping, foot adduction, heel stretching). The value of comfortable shoes cannot be overestimated. Strain on the sacroiliac joints is lessened by the wearing of a wide belt.

(3) *Allergic skin reaction and dermatitis* are due to drugs and chemicals. They are mostly of allergic nature as is indicated by other allergic manifestations (asthma, etc.), family histories, rashes not restricted to the parts exposed to chemicals. Chemicals to which sensitivity is found, should be substituted by others, or protective measures should be taken (rubber gloves). Densensitization may be instituted by the injection method.

(4) *Mercurial poisoning* appears in the dentist only in its mild form, with general ill health, lack of energy, sleepiness, nasal catarrh, abdominal discomfort, and kindred symptoms. A definite lymphocytosis can often be diagnosed, which clears up only after the elimination of all sources of mercury poisoning. There is grave doubt whether amalgam filling in teeth can cause any mercury poisoning.

(5) *Exposure to contagious and infectious diseases* is made possible by direct contact or droplet method. It is, therefore, of utmost importance to recognize the stomatologic expression of general diseases, such as: (A) measles with its Koplik spots; (B) scarlet fever with its characteristic raspberry or strawberry tongue; (C) diphtheria with its diphtheritic membrane; (D) mumps with its swollen parotid glands and the red swollen orifice of Steno's duct; (E) coryza with its catarrhal inflammation of the upper respiratory tract or paranasal sinuses; (F) influenza with its sore throat, pharyngitis and dilated, paralyzed capillaries appearing as small red lines in the mouth; (G) acute tonsillitis showing large, inflamed, infected, painful tonsils; (H) rheumatic fever with its intense pharyngitis; (I) erysipelas with its intense, diffuse redness and painful swelling which spreads by continuity; (J) septicemia and bacteremia with its diagnostic petechiae; (K) typhoid fever in its ambulatory form, presenting a heavily furred grayish yellow tongue which is bright red at the sides with a similar triangular area on the dorsum; (L) tuberculous ulcer with its intense pain and dysphagia; (M) the chancre and mucous patches of syphilis, which is particularly important (among 669 extragenital chancres there were found 638 cases in physicians and 31 in dentists); (N) the sputum of bronchiectasis, abscess and gangrene of lung; (O) trench mouth, which seems to be more frequent than ever.

(6) *Wounds on fingers* should be disinfected with iodine of phenol.

(7) *Protection of the eyes* is necessary, as flying tartar, droplets from expectoration, bleeding, etc., are potential sources of infection.

(8) *Danger from plaster work,* which frequently leads to the formation of rhagades.

(9) *Neurasthenia* is affecting more than half of the dentists, due to their working in closed rooms, strain on muscles and eyes, chronic mercury poisoning, allergic condition, etc. No dentist should work more than six hours a day.

(10) *Low blood pressure* is frequent (found in an examination of more than 150 dentists to be 100 mm. systolic and 60-70 mm. diastolic in 75 per cent). The exact cause for this is not clear, but it probably tends to increase the disability rate for dentists (physicians, 20,000 insured years; total disability, 5.99, partial, 1.68. Dentists, 10,000 insured years; total disability, 5.33, partial, 1.54. General, total disability, 4.46, partial, 1.33. Lawyers and jurists, total disability, 3.18, partial, 1.18).

(11) *Diabetes* and diseases of the digestive system are caused by fast eating and overeating. Obesity, very frequent with dentists, must be avoided because it predisposes not only to diabetes, but also to high blood pressure, heart and kidney diseases, and it increases the mortality rate. (Men below 5 feet 7 inches at the ages between forty and forty-four years who are 20 per cent overweight, have an added mortality of 30 per cent above normal weight people; if 40 per cent overweight, the increased mortality is almost 80 per cent.) Proper diet, exercises, and correction of glandular derangement are the corrective measures.

(12) *Higher death rates.* Death rates, though perhaps somewhat lower for the dentist than for the average occupied male, show excess figures for diabetes (as mentioned above) and digestive diseases, for chronic nephritis, and for suicide, the latter probably due to neurasthenia.

(13) *Fast and irregular eating* causes indigestion and hyperacidity (ulcers). Take at least one regular hour for each meal, eat slowly, chew thoroughly; 3,200 calories should prove sufficient for the average dentist, and should be divided into 400 to 500 gm. carbohydrates (yielding 1,600 to 2,000 calories), 75 gm. protein (yielding 300 calories), and 100 gm. fat (yielding 950 calories).

(14) *Use of tobacco,* if excessive, is particularly injurious to the dentist, who needs a steady hand and a clear vision. Furthermore, it aggravates digestive, cardiovascular, respiratory, and nervous disturbances.

(15) *Use of alcohol* in excessive amounts is highly objectionable. Benefits supposed to be derived from tobacco and alcohol are products of the imagination.

(16) *Care of eyes.* Myopia, hypermetropia, or astigmatism should be corrected by glasses, prescribed by an ophthalmologist. Northern or southern exposure makes no difference as long as proper and sufficient light is provided.

(17) *Relaxation* has to be learned. Spare time should be wasted, not utilized.

(18) *Motto.* Don't bother to forgive your enemies, just ignore them.

E. N.

The Forum

Articles for this department should be sent to Dr. William R. Humphrey, 1232 Republic Bldg., Denver, Colo.

Report of an Unusual Case of Root Resorption in the Mixed Dentition

A girl, eleven years old, presented at my office on Feb. 9, 1934, for a routine dental examination. The mandibular permanent cuspids having erupted some time previously, it was deemed advisable to radiograph the maxillary cuspid regions in an attempt to determine the relationship of the permanent teeth in those areas to the deciduous teeth. As was suspected, the maxillary left permanent cuspid was found to be in malposition. The maxillary right permanent cuspid was shown to occupy a position that led me to believe that it would undoubtedly erupt normally (Fig. 1 *A* and *B*).

In an attempt to prevent the possible impaction of the left permanent cuspid, the left deciduous cuspid was removed and a space retainer was placed in position immediately. Because of the apparent favorable position of the right permanent cuspid, no interference was thought necessary.

The parent was advised of the necessity of close observation of the case, and as a result of the cooperation it was possible for me to obtain a very interesting set of radiograms showing the progress of the case to date.

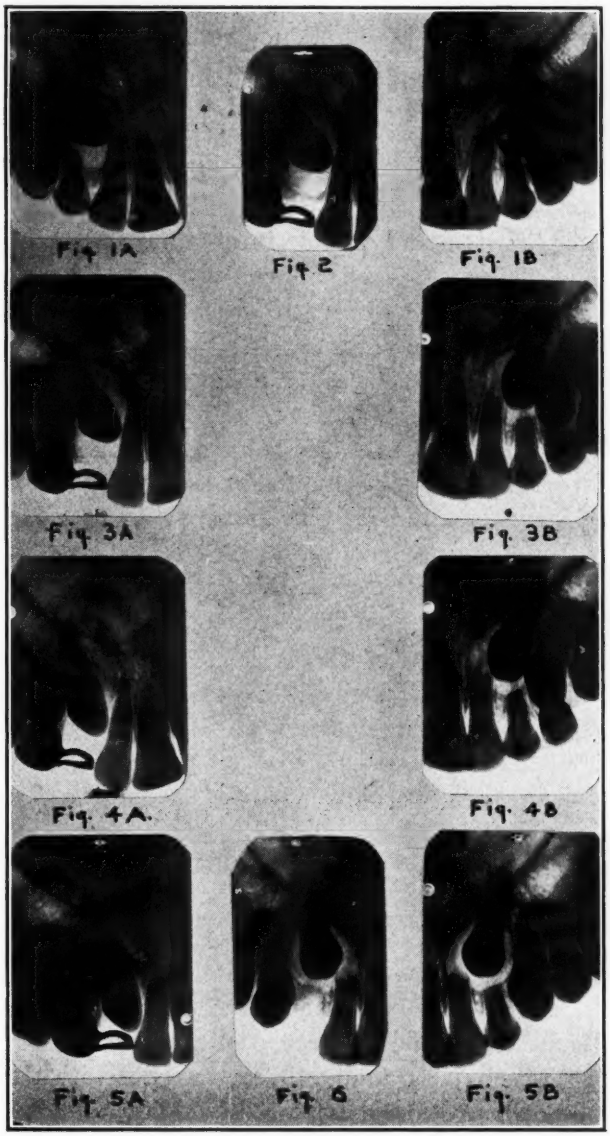
Fig. 2 shows favorable progress of the left cuspid up to June 18, 1934.

Fig. 3 *A* shows further progress of the left cuspid on Dec. 1, 1934. Fig. 3 *B*, taken on the same date, shows some slight change in the deciduous cuspid periapical region; though there does not appear to be any appreciable amount of eruptive progress on the part of the permanent cuspid.

Fig. 4 *A*, May 2, 1935, shows a very satisfactory amount of progress on the part of the left cuspid. Fig. 4 *B*, May 2, 1935, shows the right permanent cuspid area practically at a standstill; though with the assistance of Fig. 5 *B* it is possible to suspect some periapical change in the root formation of the permanent lateral incisor. This, however, was not suspected until Fig. 5 *B* was obtained six months later.

Fig. 5 *A*, Nov. 1, 1935, shows a most gratifying result in the left cuspid area with the eruption of that tooth imminent. Fig. 5 *B*, Nov. 1, 1935, came as a decided shock. I was wholly unprepared for the appearance of a very definite amount of root resorption in connection with the right permanent lateral incisor. The pericoronal area of the permanent cuspid appears to be cystic. The lateral incisor responds normally, at the present time, to vitality tests, both thermal and electric.

In an attempt to prevent, if possible, any further destruction in the region of the right lateral incisor, the right deciduous cuspid was removed and the pericoronal area adjacent to the permanent cuspid was curetted as well as



possible, in an attempt to break up any cystic sac that might have been present. Fig. 6 shows the area two weeks following the operation.

Further progress in this case will be reported as it develops.

Benjamin Kletzky.

Why Worry?

When I read Dr. Griffin's article "Befogging the Issue to the Dental Profession" which appeared in the Forum of the INTERNATIONAL JOURNAL OF ORTHODONTIA, I was moved by some of the statements contained therein but not

sufficiently to desire to enter the controversy. However, after reading Dr. Harold Noyes' critical review of the paper, my interest in orthodontic education has again been awakened and this time to the point where I desire to speak in interest of its future progress.

I completed both courses in question, proprietary in 1925, university in 1930; and had not the opportunity thus been afforded me to test the relative merits of the two systems in actual practice, the question would, perhaps, have received only a passing glance. But this experience has afforded an excellent basis for comparison and has caused me to investigate trends in the evolution of orthodontia and orthodontic training in an effort to determine the reason I was forced to spend the time and trouble in obtaining what I consider an adequate orthodontic education.

This subject of orthodontic education is not new. It has been the center of controversy for a great many years and is of paramount importance. In the final analysis orthodontic education is the determining factor in placing orthodontia in its proper relation to the parent professions of medicine and dentistry. As would be expected, the field is divided into two groups. On the one hand, there is that group which believes that orthodontia is a part of dentistry not unlike crown and bridge, inlay, and prosthetics, and that an adequate orthodontic training can be had in a short concentrated course following the regular dental training. On the other hand, there are those who believe orthodontia to be a specialized science, and that it should be so treated.

To discuss the many points of the various authors would serve no useful purpose. Such a discussion of necessity would treat of purely modern conditions and concepts, having little or no connection with the past. To obtain a more comprehensive view we must pause to analyze and evaluate the course which orthodontia has taken; then, perhaps, we can forecast the direction in which future progress lies.

In the early days orthodontia was practiced by the physician the same as was dentistry. Just as dentistry, through its own progress, created a demand for special training, orthodontia through its own progress has outgrown former methods of education. Orthodontia as a specialized science owes its beginning to the courage of a brilliant dentist, a man who had the courage to break away from the conventional and to demonstrate the real mission of the orthodontic specialist. All those practicing orthodontia are familiar with Dr. Angle's plight. For those who are not, history has recorded the incident. To relate the details here is not necessary. It is sufficient to say that Dr. Angle found it impossible, within the limits imposed at that time by the universities with which he had contact, to go forward in the new science as he thought he should. He, therefore, severed his connections with the organized institutions of learning of his day and organized the first of the proprietary schools. The value of his contribution together with the contributions of those who have succeeded him in the proprietary school cannot be overestimated. It is to this group of courageous souls that orthodontia owes its present position in the world of medical sciences, a firm position even though it be in a state of chaos at present.

As we seek to evaluate the present situation, however, we must realize that the law of change is the only law without an exception. We must remember

that chaos always precedes orderly procedure—that progress in our civilization consists in bringing order out of chaos, in developing standards where previously there were no standards, in welding diverse thoughts into a cohesive whole. It is through the agency of the proprietary school that the universities have been made to appreciate the mission and success of orthodontic practice. If, then, the proprietary school has been responsible for the awakening of the university to the possibilities of orthodontia, it has served a worth-while function. Surely, the proper place for any specialized training is ultimately in the university. The university is the storehouse, the repository of all that has gone before, and the gateway through which the oncoming generations will go out into the fields of research and achievement. It is a living entity, an ongoing entity, and not dependent for its continuity upon the life of any individual or group of individuals. The proprietary school is always dominated by one individual or at very best a very small group of individuals; it is but a transient entity passing out of the picture with the passing of its founder. Its whole teaching emphasis is controlled by the personal bias or whim of some one dominant individual. It has not the equipment, facilities, or time to impart a broad and adequate course of training. The proprietary school must accept the applicant upon the assumption that he is familiar with the fundamental sciences. True it is that every man completing a dental course has a speaking acquaintance with anatomy, histology, physiology, embryology, and kindred subjects, but in his dental course this knowledge was not interpreted in terms of orthodontia. It was taken as factual knowledge and was pigeonholed, only to be forgotten when the diploma was framed. When we take this dental graduate immediately upon graduation, or, worse yet, three or four years later, put him in a classroom, assume that he has a comprehensive mastery of fundamentals, then through a process of cramming attempt to correlate that which we assume he has with that which is to follow, the result is that he cannot and does not follow the correlation process. Our assumption has been false because he has forgotten his fundamentals. On the other hand, the university is equipped to send the graduate into a laboratory to refresh him on the fundamentals, and while this factual knowledge is being reviewed, to correlate it in terms of orthodontic theory, and from here practical application can be made by actual treatment. For the past few years we, in orthodontia, have heard the outcry of "back to fundamentals." It is generally admitted that the orthodontist has unduly stressed mechanics. This has resulted as a consequence of the great emphasis placed on mechanical training, and the dawning consciousness that mechanics is but the means to an end has been a rude shock. When aligning teeth was the goal, mechanical training in addition to dental training was sufficient, but now that the restoration of normal function through normal occlusion is the objective, a more comprehensive training is required.

The pages of history are filled with the record of institutions fighting for existence. It is only natural that the agency which has dominated a given field should resist the evolutionary process as it utilizes and discards. The barber gave way to the more expert medicine man, who in turn made way for the master doctor. Progress marches on, assimilating that which stands the test, discarding that which has served its purpose.

Why, then, concern ourselves unduly about "Proprietary Schools and Their Relation to Specialization in Dentistry"? Great though their contribution has been in the field of medicine and in the field of dentistry, why not recognize the fact that, as time goes on, that which contributes to the ultimate service of the profession will be retained, and that which has served its purpose will retreat to its place in the historical structure of the profession? Why not recognize that, after all, in all of our learned professions the development has been from the individual, through the individual school to the great correlated institutions of learning, the universities?

Why not recognize that in all professions men should be equipped to handle emergnecy situations, but that they will render their best service by taking advantage of their natural capabilities, developing them to the point of specialization, thereby the better serving their profession? In times past there were only engineers; today there are civil engineers, structural engineers, chemical engineers, heating engineers; one cannot enumerate the degree of specialization which has developed in the engineering profession. There used to be only the general practitioner; today there are, in addition, the obstetrician, the genitourinary specialist, the surgeon, the eye, ear, nose and throat specialist. In fact, medical men have realized that human limitations make it impossible for a man so to perfect himself in the mechanics of the human body that he is competent to do everything. What reason have we to doubt that dentistry will develop along the same line? Do we, any of us, flatter ourselves that we are competent so to train ourselves that we shall be able to give the service to which our patients are entitled in every phase of dentistry? Is it not the part of intelligent professional men dispassionately to face the fact that real progress has always followed the path which leads to standardization, to the pooling of all knowledge in a common reservoir, to the formation of cooperative research units? Let us continue to recognize that perhaps there still is a contribution that the proprietary school has to make, but at the same time recognize that our ultimate salvation will lie in the development of proper courses of training in conjunction with the great institutions of medical instruction and research. Only here, where men of widely diverse scientific interests are thrown together, and where they derive mutual help and are subject to mutual restraint, can orthodontia attain the place we all hope for—an integral division of general science.

C. F. Wright.

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Editorials

The American Society of Orthodontists at St. Louis

THE 1936 meeting of the American Society of Orthodontists will be held in St. Louis, April 20-23. The first day, April 20, which falls on Monday, will be given over entirely to recreation, and the remaining days of the meeting will be devoted to the scientific program.

A complete program has been arranged of such importance and practical value that no practicing orthodontist can afford to miss the St. Louis meeting. Dr. James D. McCoy of Los Angeles will present a paper on "The Diagnosis and Treatment of Dental Retroversions." Dr. Milo Hellman of New York will present "Class III Malocclusion of the Teeth as a Part of the General Problem of Orthodontia." Dr. Floyd E. Gibbin of Buffalo, with an unusually

wide background in the study of practices in America, will present a carefully prepared paper on "Efficient Practice Management as a Means of Extending the Scope of Orthodontic Service." Miss Ramay will present a paper pertaining to the voice as related to other anatomic structures; "Studies in Palatography" will be her subject. Dr. C. C. Howard of Atlanta needs no introduction to orthodontists and will give his latest work. Col. Leigh C. Fairbank of the U. S. Army will read a paper pertaining to some new phases of fracture work. Dr. Vernon Fisk will present "An Orthodontic Diagnosis Based Upon Osseous Structure." This paper will comprise a simple technic which is adapted to and practical for private practice. Attention will be drawn to the marked variation of the alveolar medullary trabeculae and some of these variations correlated with similar variations in the trabeculae in the hand. There will be seven star clinics, that is, clinics similar to those held in New York last year in which groups will be admitted by ticket only in order to avoid confusion, and every orthodontist may see the star clinics which he most desires to see. There will be a paper by James B. Costen, M.D., of St. Louis, "Symptoms Associated With Disturbed Function of the Mandibular Joint" —study of 100 cases. This study is of particular interest to orthodontists because it calls to mind some new things pertaining to organic disturbances of the mandibular joint which are associated with the ear and other structures. Dr. Gerald Franklin of Montreal, Quebec, will talk about etiology, diagnosis, and treatment of Class II, Div. 1, an interesting subject to all practicing orthodontists.

More will be announced about this meeting later, and until then orthodontists should make plans to be in St. Louis April 20-23; the first day, Monday, April 20, is to be devoted entirely to recreation.

Another Dental School Survey

THE American Association of Dental Schools in its annual session in March, 1935, passed a resolution recommending that a two-four program of dental education be put into effect beginning September, 1937. The second section of the resolution is as follows:

> "And be it further
> *Resolved,* that this Association express its disapproval of rigid specification of required subjects in the two years of work in the college of arts and sciences by any regulatory body other than the universities and school themselves." (See Proceedings of the Twelfth Annual Meeting of the American Association of Dental Schools held at Chicago, Illinois, page 60.)

This action, obviously, was the result of the reports made by the Curriculum Survey Committee of the American Association of Dental Schools, which report was made possible by a grant from the Carnegie Corporation of New York. The survey was started in 1931 and was completed practically

three years later. Its appraisal of health service and educational programs sought to offer a proper solution to the dental education problem.

Just about the time this report was published and its contents were made known to the dental profession, along came a committee known as the college committee of the Tennessee State Dental Association which proposed a by-law amendment at the 1935 annual session of the American Dental Association to create a committee by the American Dental Association to make a thorough study of the present status of dental education.

The proposed plan introduced by Tennessee somewhat follows an outline apparently similar to the Council on Medical Education and Hospitals, which it is said has proved of great service to the medical profession. The amendment, as introduced, proposed to create a body known as the Council on Dental Education and Infirmaries to be composed of seven members nominated by the Board of Trustees, and to be elected by the House of Delegates; and the usual rotating system of election was proposed. Under the head of duties of the Council on Dental Education and Infirmaries the amendment proposed that it will be the duty of the Council:

1. To investigate the condition of dental education infirmaries, schools of hygiene and associated subjects, and to suggest means and methods by which the same may be improved.
2. To inspect and classify all schools of dentistry, infirmaries, schools of hygiene and associated subjects.
3. The classification is to be based upon the ethical practices of the institution as well as on the scientific work.
4. The Council to have the authority to change the classification of a dental school infirmary or school of hygiene or associated subject at any time.

The original amendment was referred to the Reference Committee, which heard arguments pro and con. Before the Reference Committee rendered a decision, the proponents of the proposed change in the by-law withdrew it and offered in its place a new resolution with the following salient points:

> First, that the Board of Trustees of the American Dental Association appoint a Committee of five to make a thorough study of the present status of dental education; second, that the purpose of the survey is to ascertain how the American Dental Association can better cooperate with various educational agencies to improve the relation between the public and the dental profession; third, that the Committee render a written report to the Board of Trustees on the same, and that copies of this report be placed in the hands of the House of Delegates two weeks prior to the next annual session.

For several years there has been a great deal of unrest, particularly in the South and Southeast, in regard to dental education and dental schools, and it is apparent that the Carnegie survey does not meet the requirements of all members of the House of Delegates of the American Dental Association. Georgia and Tennessee obviously joined hands upon this question and went

to the New Orleans meeting with the express purpose of starting a movement within the American Dental Association itself, which would serve the purpose of advancing the educational status of dentistry on a par with the advancement of education in other departments of the arts and sciences. In informal conversation with those who are the principal sponsors of this movement, the impression is gained that many feel there should be some kind of yardstick of dental education within the American Dental Association itself, as there is within the American Medical Association, to survey its educational problems.

Medical schools are being investigated at this time by a committee appointed by the American Medical Association, and there seems no doubt but that the committee is finding conditions which need to be corrected and which will obviously be corrected.

Dental education means much to the future of dentistry. It cannot be expected to see a profession in which culture and science are in the ascendancy unless extreme caution is taken in the selection and training of those who are to enter the profession. Medical schools will no doubt be compelled to decrease from 20 per cent to 25 per cent the attendance in the freshman classes in 1936 or 1937. Naturally many students who desire to study medicine and cannot obtain admission to medical schools will turn to dentistry and pharmacy. Schools of dentistry and pharmacy will probably have more applicants in the next few years than they have had in the past; therefore if strict requirements for admission to these schools are not enforced, many undesirable students may be matriculated.

It will be interesting to note what the committee will do, and to note the attitude of the deans of the various dental schools toward the survey committee. Full cooperation of the schools to this committee will make a highly favorable impression upon members of the dental profession who have been following this episode, and will do much to allay the unrest and opposition to dental education which has developed in some quarters.

The Educational Survey Committee of the American Dental Association has recently been officially appointed and consists of H. W. Alden, Northampton, Mass.; M. Webster Prince, Detroit; Hugh D. MacMillan, Cincinnati; Thomas R. Sweet, Oakland, Calif.; and Virgil Loeb, St. Louis.

H. C. P.

Message from Dr. George Winter, President of A.D.A.

IT IS the duty of every dentist in America to join the A.D.A. Friendship and sociability suggest it. The honor of our beloved profession requires it. Self-interest and the interest of those dear to us and dependent on us demand it. How shall we protect both ourselves and the public from the artful advertiser with his bombast and seeming bargain prices? How shall we, except by united effort, shut off quacks and the illegal practitioner? How shall we meet the threat of commercial laboratories? Finally, and most menacing of all, is the diversion of our incomes by state or corporations and by new insurance legislation.

No efforts of individuals or local groups can meet problems that are state wide, nation wide, or world wide. There is a maxim that is old and threadbare, but that can never be replaced. It is as virile now as it was the day we first read and felt its cogency: "In union there is strength." It is a variation of our own United States motto, *E Pluribus Unum,* "Out of many, one." We must have a powerful national organization, built upon and en-

Dr. George Winter

forced by local and state organizations. Thus only can the science and art of dentistry maintain its position, its standards, its traditions, and its ethical principles.

The officers and trustees of the American Dental Association feel their responsibilities keenly and are doing their utmost to conduct the association efficiently and economically, but day by day they realize more that they must have the dentists of America behind them individually as well as collectively. Hence, we urge every dentist in America to join our body and give us his personal support. Let our slogan be, "One for all and all for each."

In Memoriam

Daniel Hubbard Squire
1869-1935

ON JULY 6, 1935, Dr. Daniel H. Squire, dean of the University of Buffalo School of Dentistry for twenty-three years, died at his home in Snyder, New York. The death of Dr. Squire brought to a close the career of one of the foremost men in dental education in this country.

Daniel Hubbard Squire was born at Lisle, New York, on May 4, 1869, the son of James Stoddard and Augusta French Squire. His early childhood was spent on his father's farm, and later he obtained his preliminary schooling at the Lisle Academy. In 1890 he entered the University of Pennsylvania. He attended this institution for one year and then matriculated in the University of Michigan College of Dentistry in Ann Arbor.

When the Dental Department of the University of Buffalo was organized in 1892 with Dr. William C. Barrett as the first dean, Daniel Squire transferred to the newly formed school and was graduated in the first class in 1893. His superior ability and keen intellect immediately won him recognition, and he was appointed instructor of anatomy in the Dental Department after graduation. In 1906 Dr. Squire was made associate professor of operative dentistry and also occupied the chair of professor of anatomy. He became superintendent of the Operative Clinic that same year. During the years following his graduation Dr. Squire succeeded in establishing a growing dental practice in Buffalo. He was chosen professor of operative dentistry in 1909. Three years later he was asked to become head of the dental faculty. He retained this position until the time of his death.

He had the foresight to note what became apparent to others long after —that dentistry is closely allied to medicine; that dentistry is a healing science, not just a mechanical craft. With this idea in mind Dr. Squire proceeded to incorporate the basic medical sciences into the dental curriculum, these subjects to be taught in the medical school by members of the medical school staff. With this as a beginning, additional medical courses were gradually added until the graduate from dental school had a firm grounding in the fundamental medical sciences as well as in clinical medicine. Thus did Dr. Squire bind together the two great sciences of healing.

Another innovation put into operation by Dr. Squire was establishing the "quarter" plan of instruction in the dental school. In this way the school year was divided into four quarters of eleven weeks each, with short vacation periods between quarters. Thus the dental course was shortened to three calendar years—this being equivalent to the usual four school years. Dr. Squire maintained that the lengthy summer vacation was detrimental to the

work of the students and the quarter plan effectually eliminated it. This new system went into effect in 1929, and the Dental School is functioning under it at the present time.

Dr. Squire had a wide acquaintanceship in dental and medical circles. He was president of the American Institute of Dental Teachers in 1913-14 and served as first president of the Alumni Association of the University of Buffalo School of Dentistry. He was a member of the American Dental Association, the Eighth District Dental Society of New York, the Buffalo Dental Society, and the Xi Psi Phi dental fraternity. Taking a deep interest in the arts and sciences, Dr. Squire was a member of the Buffalo Historical Society and the Buffalo Society of Natural Sciences.

In 1929 he retired from active practice. He was particularly fond of motoring, especially in the country, and gardening was also his hobby.

Dr. Squire was held in high esteem by his confreres and students, and he was always ready to assist them in any way. He was always fair and impartial in his dealings with students and constantly respected their confidences.

In March, 1934, Dr. Squire was appointed chairman of a committee chosen to draw up a dental curriculum that would serve as a model for dental schools recognized by the Board of Higher Education of New York State. He was about to complete this task at the time of his death. He is survived by his wife, Augusta French Squire, two sons, two daughters, and a brother.

Since he possessed vision, ability, and initiative, the vacancy in American dentistry left by his loss will not be readily filled.

News and Notes

American Society of Orthodontists

The Local Arrangements Committee has completed all details for the meeting of the American Society of Orthodontists to be held in St. Louis, April 20 through 23.

The Jefferson Hotel has been selected for the many desirable features it has to offer for a convention. The hotel offers every refinement and setting to help make this meeting

Jefferson Hotel Lobby.

a success: easy access to the shopping and theater districts; large, well-lighted and ventilated halls for the general sessions and clinics.

So dust off and refill that fountain pen that never writes, and be prepared to fill in your desires when you receive the questionnaire which will soon be sent to you.

Arrangements are being planned and carried out so that you will enjoy the meeting and your stay in St. Louis.

Local Arrangements Committee

G. H. HERBERT, Chairman,
E. H. GOLDEN
A. C. MOGLER

American Board of Orthodontia

A meeting of the American Board of Orthodontia will be held at the Jefferson Hotel, St. Louis, on April 17 and 18. Those orthodontists who desire to qualify for a certificate from the Board should secure the necessary application from the secretary. The application must be returned to the secretary, together with any other required credentials, at least sixty days prior to the date of examination. Applications filed at the time of the board meeting will have preliminary consideration, so that the applicant may be advised of the work required for his subsequent examination. Attention is called to the following resolutions adopted by the Board:

Any person desiring to make application to the Board for a certificate shall have been in the exclusive practice of orthodontia for a period of not less than five years or an equivalent to be determined by the board and based upon the following conditions:

1. He must be an instructor in orthodontia in a school satisfactory to the Board.
2. He must be an associate in the office of an orthodontist whose standing is satisfactory to the Board.
3. It is definitely to be understood that any person at the time of making application for a certificate shall be in the exclusive practice of orthodontia in his own name.

OREN A. OLIVER, President.
CHARLES R. BAKER, Secretary,
636 Church Street,
Evanston, Ill.

The Albert H. Ketcham Medal

When Dr. Albert H. Ketcham passed away on December 6, 1935, the orthodontic world at large sustained a great loss. Because of his broad understanding of the orthodontic problem, and the high goal of attainment he set for himself as well as for the many fellow specialists he so much delighted to help, his place in orthodontia was unique. No man ever gave more generously of his time, effort, or ability for the advancement of our specialty than did Dr. Ketcham. Handicapped as he was for forty years by many disabilities, he never faltered in his exacting labor, nor did his interest lag.

As the first president of the American Board of Orthodontia, a position he held from the inception of the Board in 1929 until last May (and continuing as a member of the Board to the end), his wide experience and mature counsel went far to make the work of the Board a success.

To commemorate his splendid achievements and, better still, to prove an inspiration to the advancement of orthodontia, it is now proposed to set up a permanent memorial to be known as the ALBERT H. KETCHAM MEDAL, this medal to be awarded annually to the orthodontist or other scientist who, in the judgment of the Award Committee, has made an outstanding contribution to the science and art of orthodontia during the then current year or during some previous year. The Award Committee will consist of three members of the American Board of Orthodontia and two members of the American Society of Orthodontists.

A fund is accordingly being sought which, when invested in ultraconservative securities, will yield a sufficient sum of money to defray the annual cost of the medal. It is believed that all orthodontists will consider it a privilege to have a part in this memorial. Contributions may be sent to Dr. Charles R. Baker, 636 Church Street, Evanston, Ill.

OREN A. OLIVER
B. FRANK GRAY
CHARLES R. BAKER

Committee.

Thos. P. Hinman Midwinter Clinic

The 1936 session of the Thos. P. Hinman Midwinter Clinic will be held March 9 and 10 at the Atlanta Biltmore Hotel, Atlanta, Ga.

CLINTON C. HOWARD, Chairman.

The Edward H. Angle Society of Orthodontia

The Edward H. Angle Society of Orthodontia will hold its meeting at Hotel Del Monte, Monterey, Calif., April 5 to 11, inclusive.

GEORGE W. HAHN
Channing Way at Telegraph Ave.
Berkeley, Calif.

North Carolina Dental Society

The sixty-second annual meeting of the North Carolina Dental Society will be held May 11, 12, 13, in the Carolina Hotel at Pinehurst, N. C.

All members of the American Dental Association are cordially invited.

FRANK O. ALFORD, Secretary
405 First National Bank Bldg.
Charlotte, N. C.

Tennessee State Dental Association

The next meeting of the Tennessee State Dental Association will be held in Memphis, May 11, 12, and 13, 1936, at the Peabody Hotel.

J. FRANK BIGGER, President,
Medical Arts Building,
Memphis, Tenn.

E. J. JUSTIS, Sec'y-Treas.,
Exchange Building,
Memphis, Tenn.

Dental Society of State of New York

The sixty-eighth annual meeting of the Dental Society of the state of New York will be held May 12-15, 1936, at the Waldorf-Astoria Hotel in New York City.

A cordial invitation is extended to all ethical dentists to attend the sessions.

Further information may be obtained by writing to:

DR. CHARLES M. MCNEELY, President
1 Nevins Street
Brooklyn, N. Y.

DR. A. P. BURKHART, Chairman Program Committee
57 E. Genessee St.
Auburn, N. Y.

Dental Congress of the F.D.I. in Vienna

Only a few more months remain before the date on which (August 2-8) the Ninth International Congress of the Federation Dentaire Internationale will take place in Vienna. The most distinguished leaders in every branch of the science will take part in this meeting, which bids fair to be an event of great importance in the world of dental science, and these leaders will report on the latest progress of their researches. Every colleague, without exception, no matter which of the congress languages he speaks, will be able to follow the presentations. The novel type of translation service will make it possible for the hearer, by merely pressing a button on the earphone attachment at his side, to hear the language he desires, so that he may have the paper, as well as the explanation of the slides, in the language with which he is most familiar.

At this meeting not only theoretical material will be presented, but the wishes and needs of those in actual practice will be met to a very generous degree: on four afternoons, leading specialists of international reputation will demonstrate the latest improvements in technic in practical fields, in total and partial dentures, crowns, bridgework, and technic in the use of porcelain. Here, as well, interpreters will simplify the explanations between demonstrators and visitors.

Furthermore, the Congress has as its aim the furthering of science and practice in a like degree. It will stimulate interest along every line and will offer valuable opportunities for contacts and the exchange of professional ideas with persons from every part of the world.

A wealth of scientific and industrial material will be shown in the formal exhibitions in a special building arranged to insure the best possible conditions for exhibiting, and will offer the opportunity for acquaintance with the newest types of equipment on the market.

And Vienna, famous for science and art, offers a setting worthy of the congress.

During the hours given over to scientific presentation, a special committee will be occupied in entertaining the families and guests of visitors. Arrangements have been made to visit the many famous sights of the city, and for the women guests in particular to see something of the Vienna famous as a style center, and as a world-famous center for decorative art.

The Congress members, after the close of the program, may, with relatives and new and old friends, visit the beautiful old landmarks of Vienna, the city possessing the oldest European culture, and the many churches, museums, galleries, castles, and royal palaces. The lovely surroundings of Vienna offer, as does no other city in Europe, the possibility of reaching in a few minutes by car the most delightful forest with the most charming possibilities for rest and refreshment.

Furthermore, the dentists of Vienna will do all in their power to give you and your guests so warm a welcome and so delightful a visit that the visitors at the Ninth International Dental Congress at Vienna will take home with them never-to-be-forgotten memories.

Report of the Meeting of the Southern Society of Orthodontists

The fourteenth annual meeting of the Southern Society of Orthodontists was held January 27, 28, and 29 at the Hotel Patten, Chattanooga, Tenn. The following program was given:

"President's Address" by Winston P. Caine, Chattanooga; "Practical Orthodontia" by Lowrie J. Porter, New York City; "Graphic Illustration of Appliance Construction" by Ernest N. Bach, Toledo; Case reports by H. L. Parks, Atlanta, by John A. McPhail, Cincinnati, and by E. W. Patton, Birmingham.

The following clinics were given: "A Functional Appliance," by Harvey G. Bean, Toronto, Canada; "Special Plier Demonstration," by W. K. Slater, Knoxville; "Making Appliances," by Ernest N. Bach, Toledo; "An Adjustable Arnold Spring," by P. J. Thomas, Savannah; "Space Maintainers," by Van A. Stilley, Paducah; "More Specific Methods of Treatment," by A. LeRoy Johnson, New York City; "A Little Experience With Cleft Palate

Cases,'' by W. E. Lundy, Memphis; ''Lingually Horizontal Bilateral Impacted Canines,'' by Fred Aldrich, Columbus; ''Odds and Ends in Orthodontic Procedures,'' by E. F. Buckley, Little Rock; ''The Old Bite Plate and Some of Its Many Uses,'' by J. A. Gorman, New Orleans; ''A Standardized Technic of Photography; Subject Presented by Movies,'' by H. L. Parks, Atlanta; ''Procedures Which Have Proved Their Value,'' by George M. Anderson, Baltimore; ''Moving Picture on Band Technic, Construction of Labial and Lingual Arches, Auxiliary Springs and Guide Planes,'' by Oren A. Oliver, Nashville; ''Child Growth and Development,'' by Glenville Giddings, M.D., Assistant Professor of Medicine, Emory University; Case report by Harry E. Kelsey, Baltimore, Md.; ''Facts, Fictions and Fallacies in Orthodontia,'' by Andrew Francis Jackson, Philadelphia.

Tuesday afternoon was set aside for recreation, and a sight-seeing trip was made up Lookout Mountain to Point Park and other places of interest. The annual banquet and dance were given Tuesday evening, President Winston P. Caine presiding.

Note of Interest

Dr. Oscar E. Busby, orthodontist, announces the removal of his offices to the Wilson Building, Dallas, Texas.